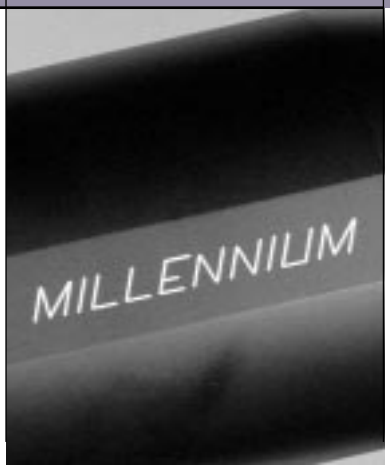
THE PANAFLEX MILLENNIUM

Operations Manual



PANAVISION

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Second edition: 09/00

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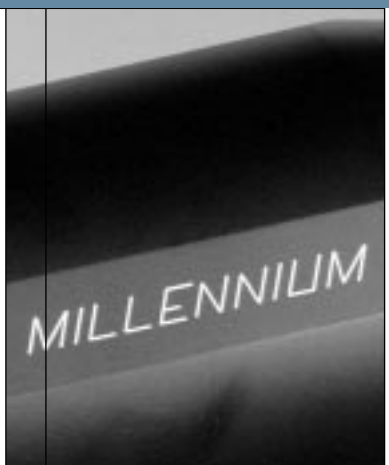
Operations Manual



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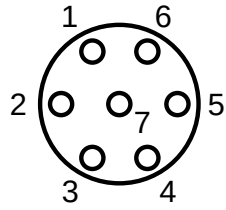
This manual is specific to the operation of the Panaflex Millennium. For general information and specifics on other Panaflex cameras, please refer to The Panaflex Users Manual by David Samuelson.

one

general specifications

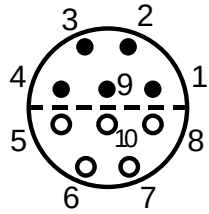
1.1 Cable specifications

Focus & T-Stop Motor — 7 Pin Lemo #1B to 7 Pin Lemo #1B



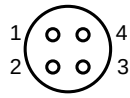
1	Motor +
2	Motor -
3	Ch A
4	+5 VCC
5	Ground
6	Ch B
7	ID

Auxiliary — 10 Pin Lemo #2S to 10 Pin Lemo #2S

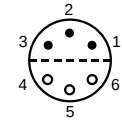


1	24V OUT
2	Camera ID
3	9V OUT - When camera is on
4	Tach OUT
5	Spare
6	Remote Clock Relay
7	Remote Clock Signal IN
8	Ground
9	Shutter Pulse
10	Remote ON/OFF

Zoom Motor — 4 Pin Lemo #1B to 6 Pin Lemo #2S



1	Feedback	3	
2	Feedback	4	
3	Motor	2	
4	Motor	5	

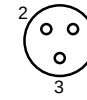


Zoom Power — 2 Pin Lemo #1S to 2 Pin Lemo #1S

1	24V OUT
2	Ground

Power Cable — 3 Pin Lemo to 3 Pin male XLR

1	24VDC
2	Ground



● = pin, ○ = socket

Connector as viewed from the rear with keyway up. Connectors are numbered counterclockwise in the plug and clockwise in the receptacle.

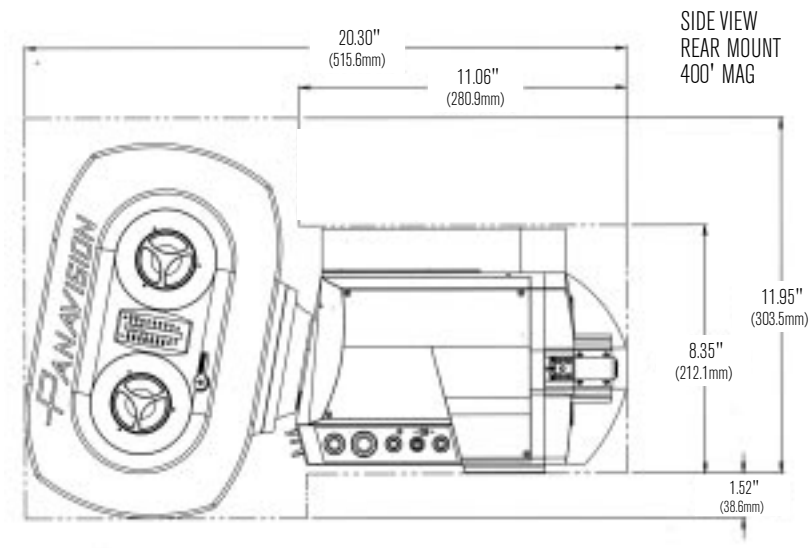
1.2 Camera specifications

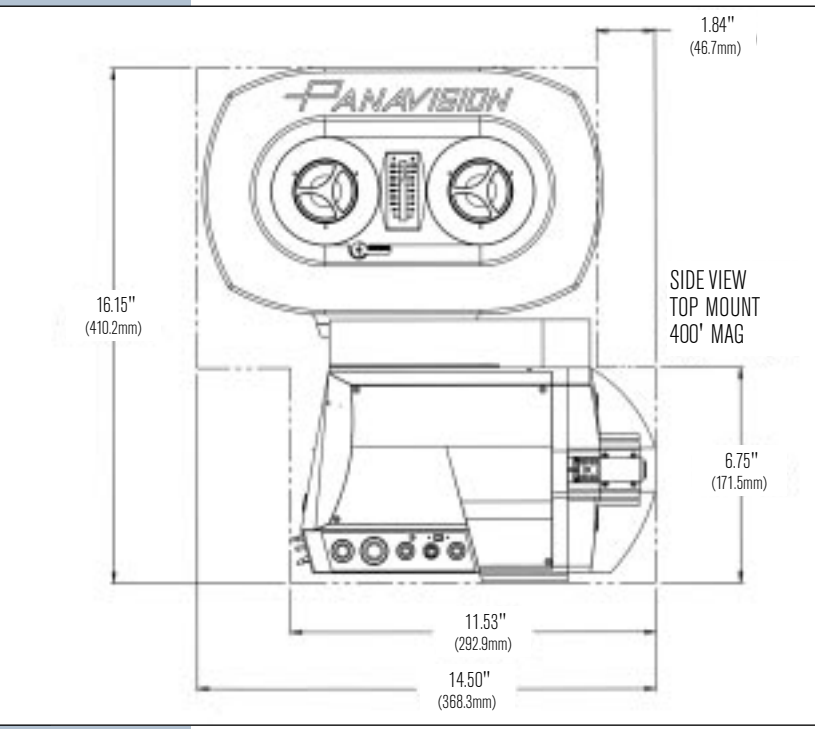
Flange Focal distance	2.2488" 57.119mm
Power	24 volt System
Speed Range	3-50 FPS forward/reverse
Shutter Angle	11.2-180º Electronically Controlled
Motor	DC Brushless
Motor Control	Digital PLL
Fuses	Auto-Reset Thermal
Mirror	150º Full Reflex

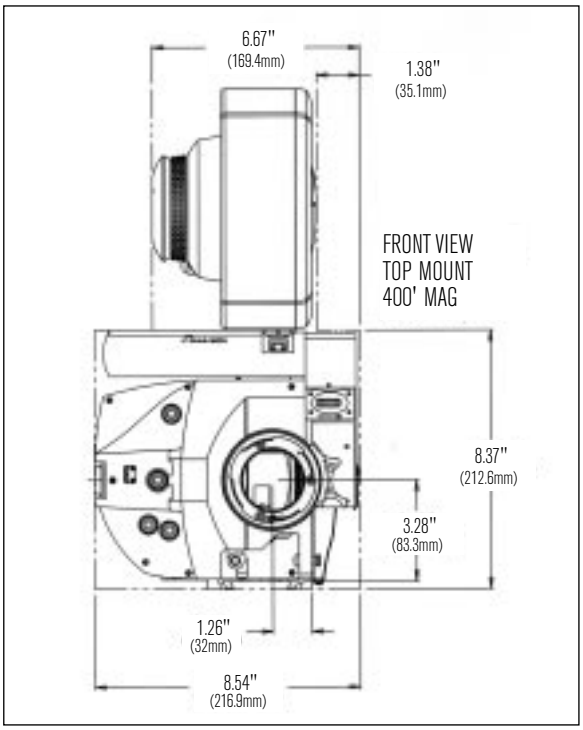
Camera weights and measures

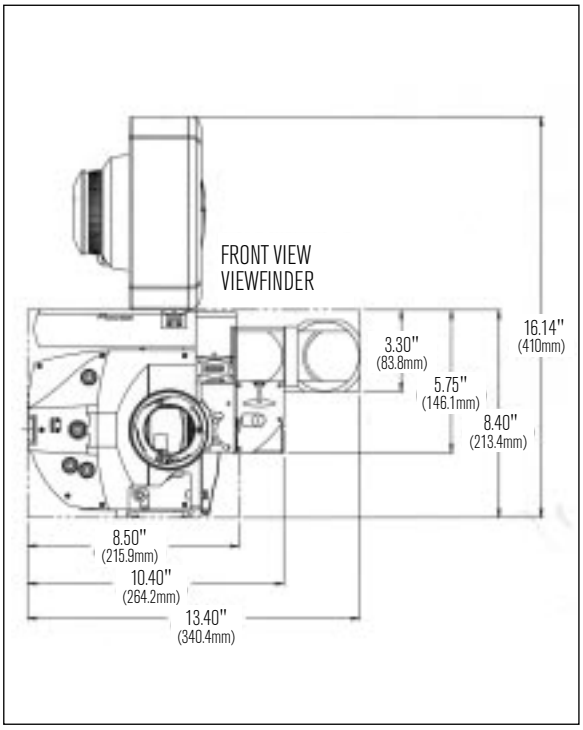
Body–Steadicam Ready	PFX-M	17.2 lbs.	7.80 kg.
Focus Tube	MFT	3.9 lbs.	1.77 kg.
Extension Eyepiece	MEPX	4.7 lbs.	2.13kg.
Hand Held Eyepiece	MEPP	1.1 lbs.	0.50 kg.
1000' Magazine	MM10	12 lbs.	5.44 kg.
400' Magazine	MM4	6 lbs.	2.72 kg.
Iris Rod Bracket	MIRB	1.1 lbs.	0.50 kg.
Butterfly Digital Display	MDD	0.5 lbs.	0.23 kg.
Hand Held Rig	HHGA	4.1 lbs.	1.86 kg.
Steadicam Adapter Plate	MSCD	0.7 lbs.	0.317 kg.
Steadicam Low-Mode Adapter	MSCPA	0.5 lbs.	0.23 kg.

1.3 Camera illustrations–400' magazine

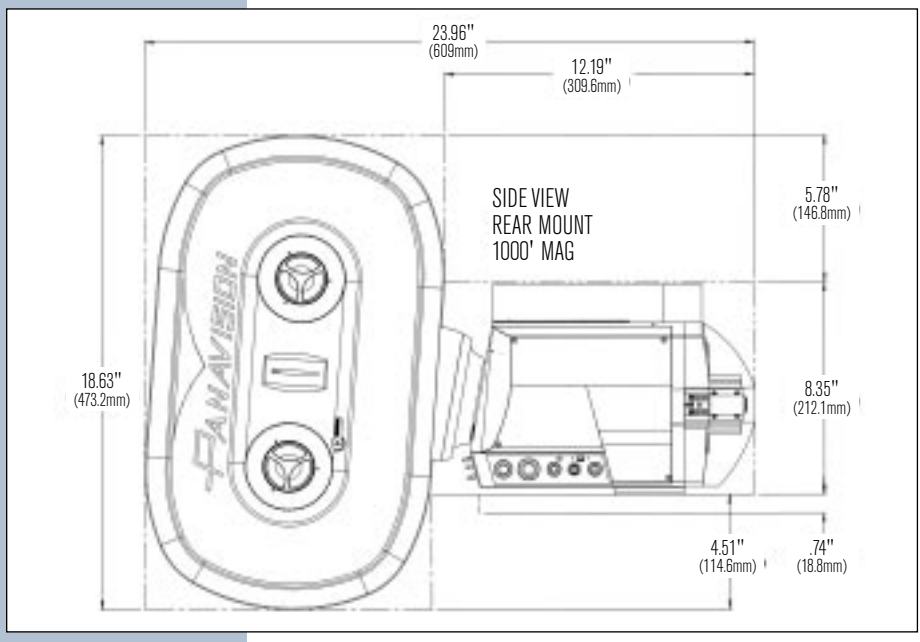


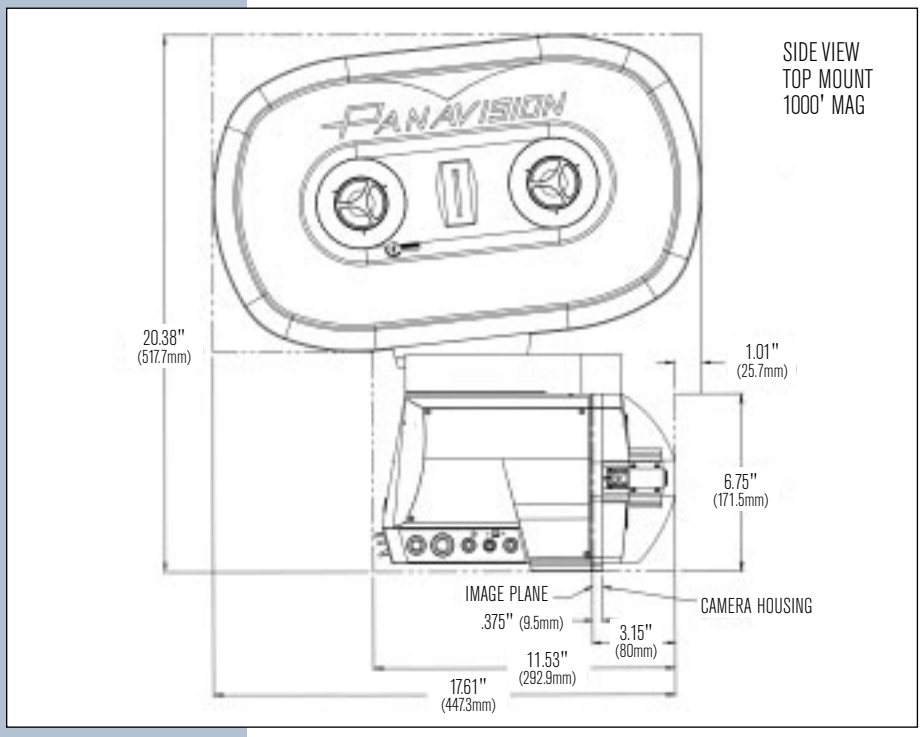


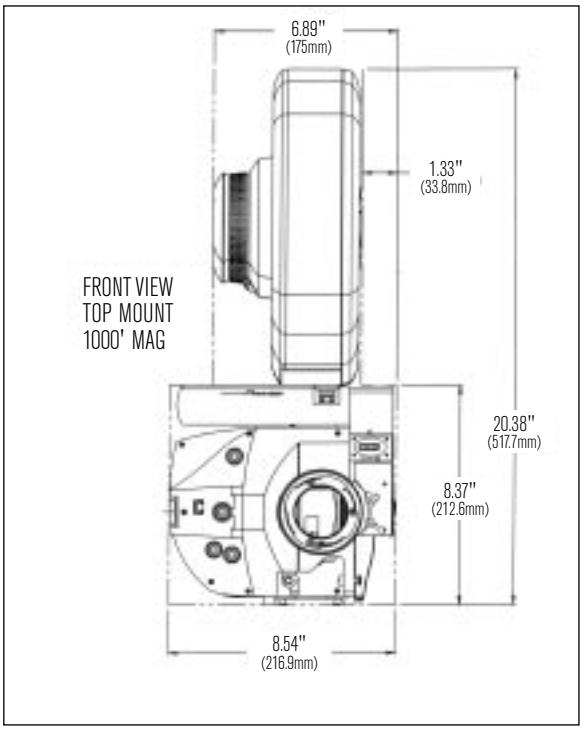

6.67"
(169.4mm)
1.38"
(35.1mm)
FRONT VIEW
TOP MOUNT
400' MAG
8.37"
(212.6mm)
3.28"
(83.3mm)
1.26"
(32mm)
8.54"
(216.9mm)

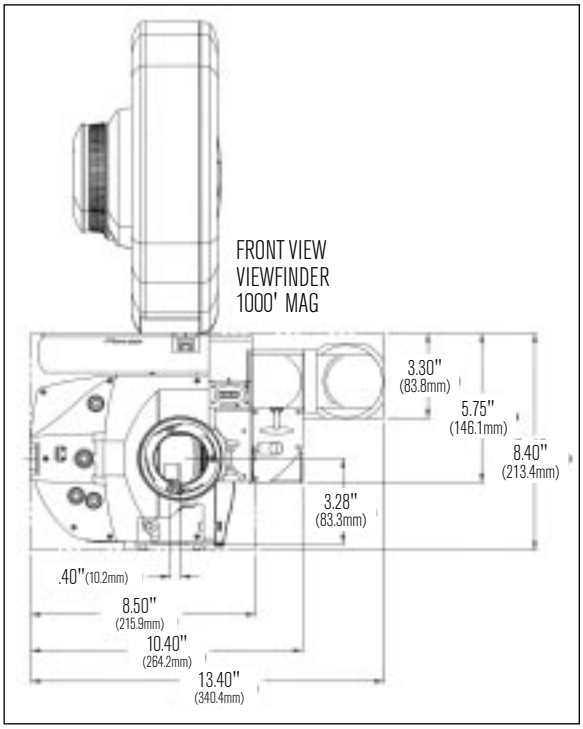

FRONT VIEW
VIEWFINDER
16.14"
(410mm)
3.30"
(83.8mm)
5.75"
(146.1mm)
8.40"
(213.4mm)
8.50"
(215.9mm)
10.40"
(264.2mm)
13.40"
(340.4mm)

1.3 Camera illustrations–1000' magazine

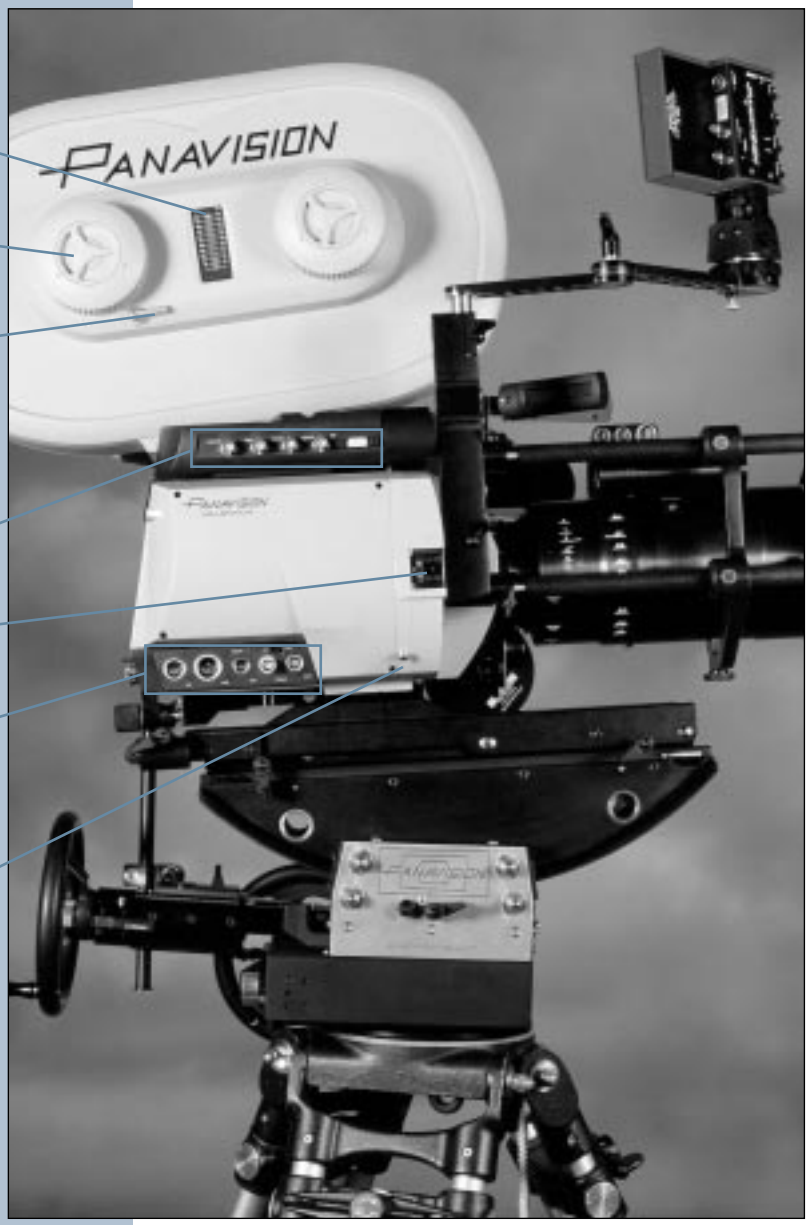


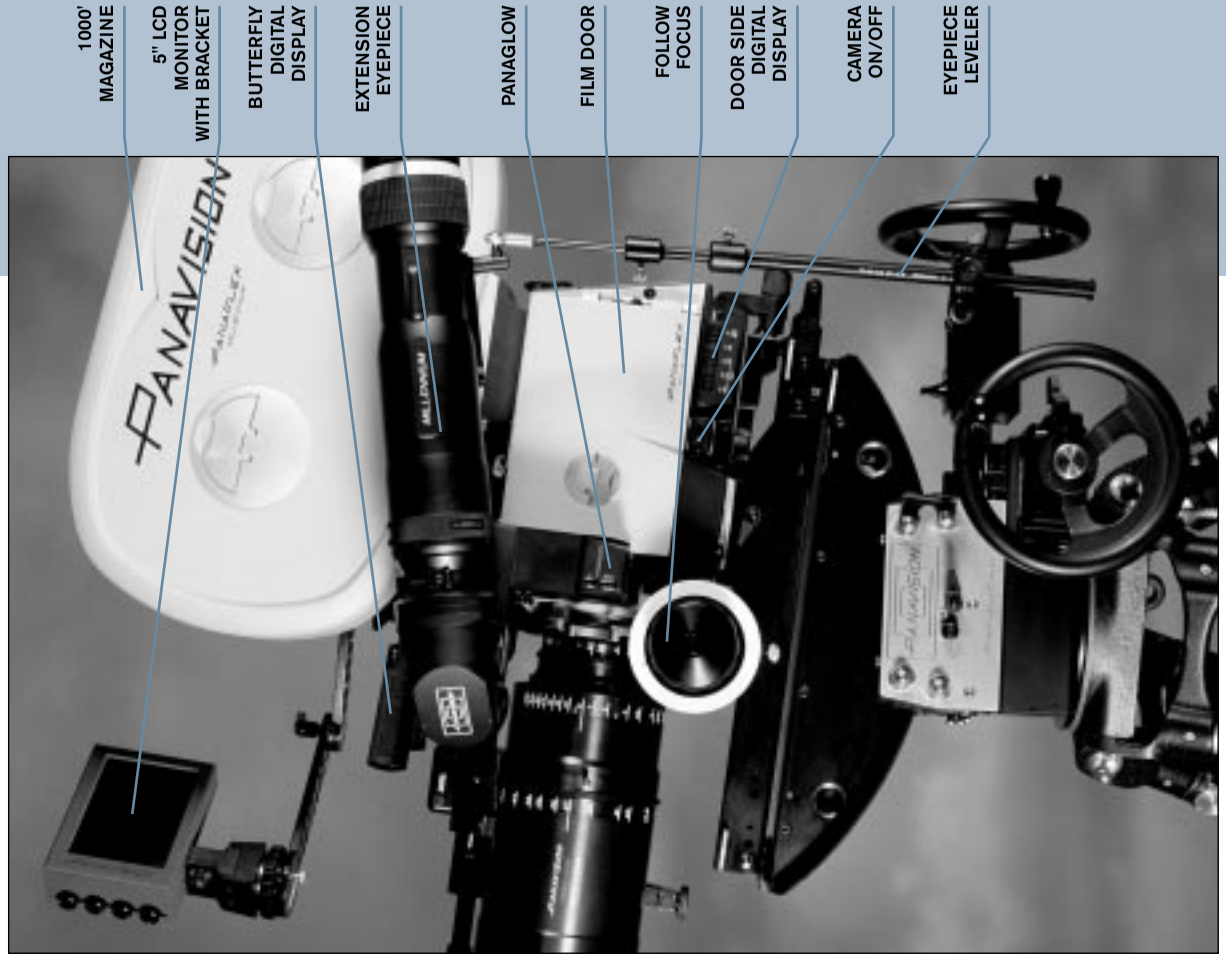



6.89"
(175mm)
1.33"
(33.8mm)
FRONT VIEW
TOP MOUNT
1000' MAG
20.38"
(517.7mm)
8.37"
(212.6mm)
8.54"
(216.9mm)

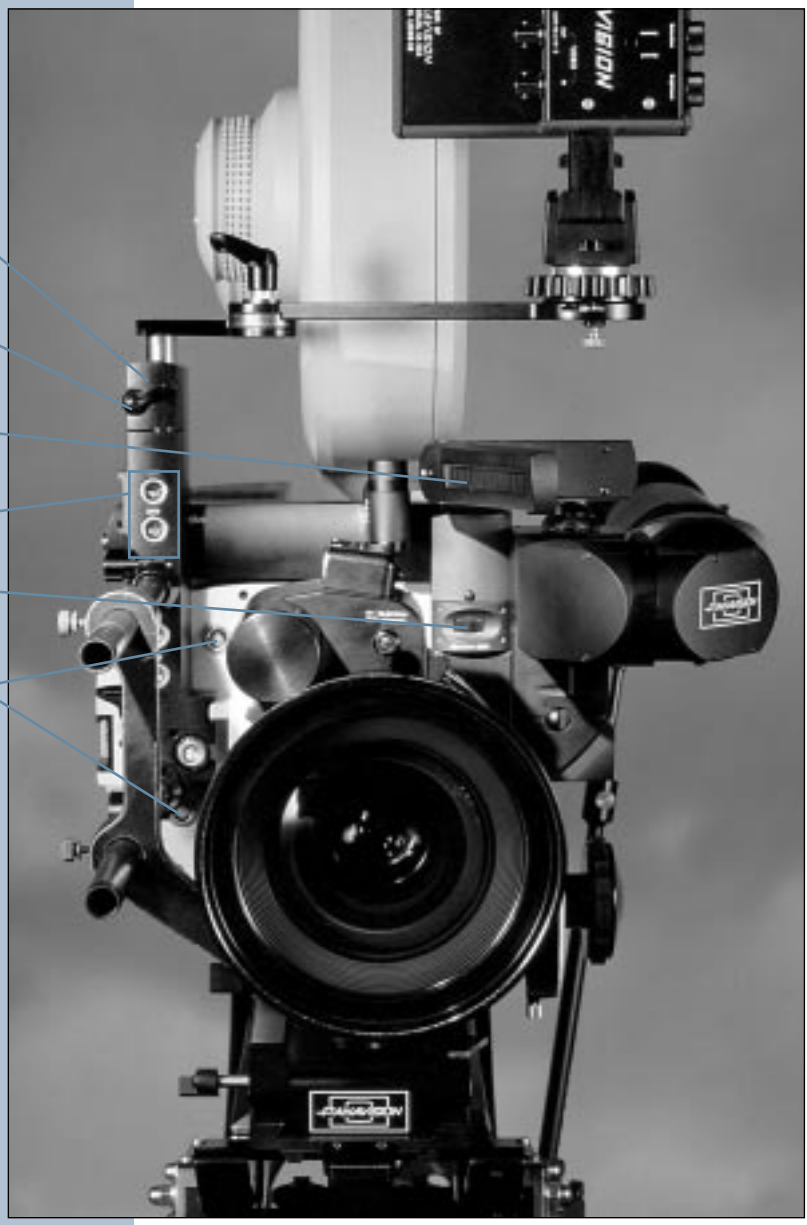

FRONT VIEW
VIEWFINDER
1000' MAG
3.30"
(83.8mm)
5.75"
(146.1mm)
8.40"
(213.4mm)
3.28"
(83.3mm)
.40"(10.2mm)
8.50"
(215.9mm)
10.40"
(264.2mm)
13.40"
(340.4mm)

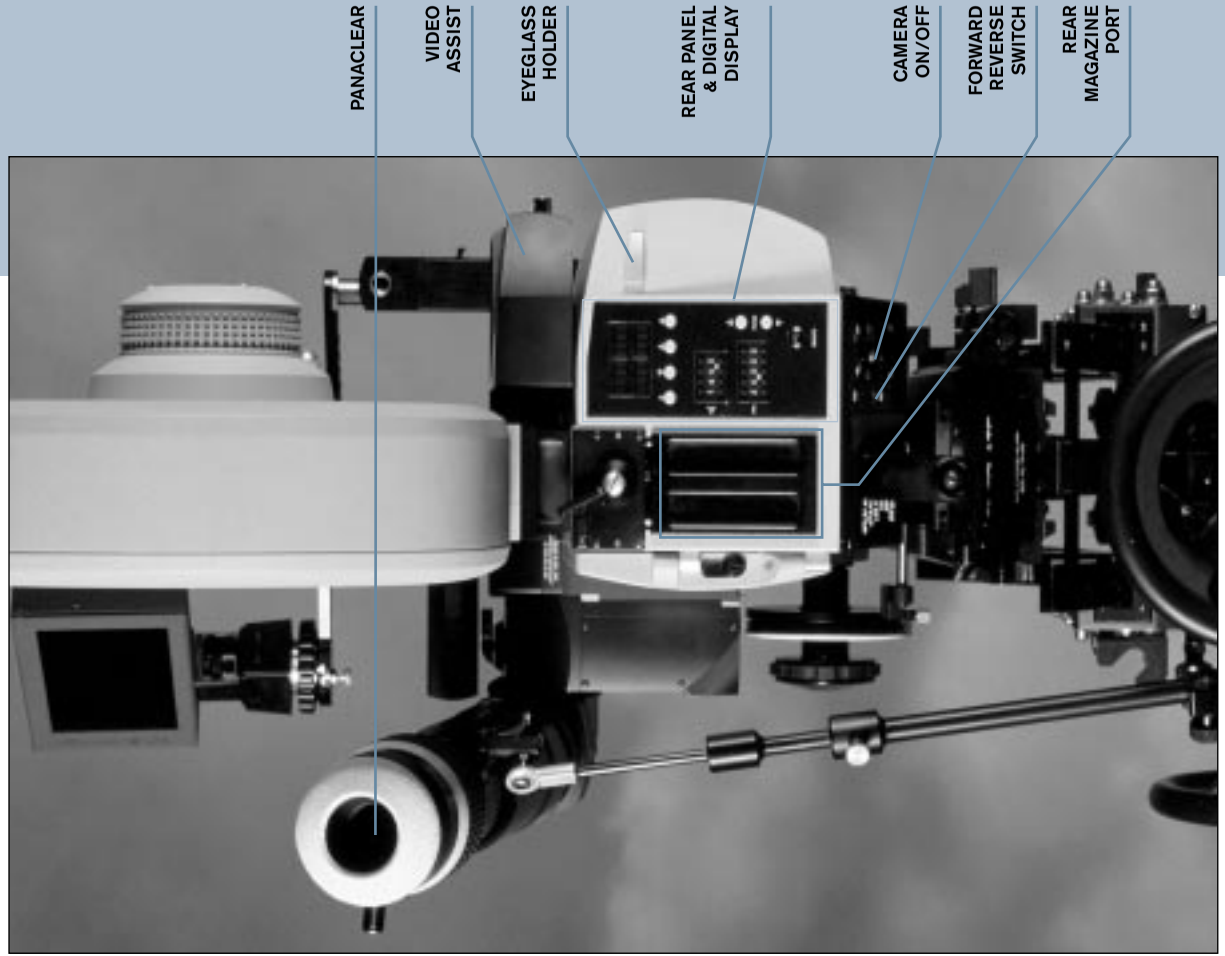
1.4 Side camera views



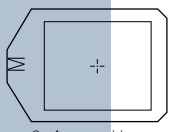

1000' MAGAZINE
5" LCD MONITOR WITH BRACKET
BUTTERFLY DIGITAL DISPLAY
EXTENSION EYEPIECE
PANAGLOW
FILM DOOR
FOLLOW FOCUS
DOOR SIDE DIGITAL DISPLAY
CAMERA ON/OFF
EYEPIECE LEVELER
PANAVISION
MILLENNIUM

1.5 Front and rear camera views

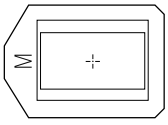



PANACLEAR
VIDEO ASSIST
EYEGLASS HOLDER
REAR PANEL & DIGITAL DISPLAY
CAMERA ON/OFF
FORWARD REVERSE SWITCH
REAR MAGAZINE PORT

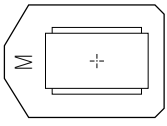
35MM THEATRICAL FORMAT



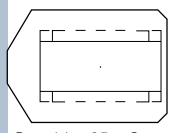
2x Anamorphic
2.40:1



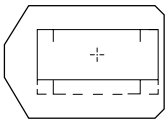
1.85:1 – Academy



1:85 – TV

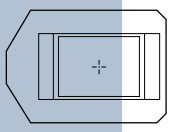


Super Panavision 35 – Symmetrical
2.40:1 – 1.85:1 – 1.33:1 (4x3)

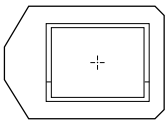


Super Panavision 35 – Common Head Room
2.40:1 – 1.85:1 – 1.33:1 (4x3)

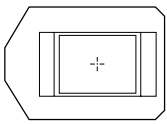
35MM TELEVISION FORMAT



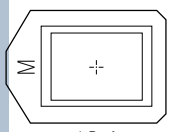
Super Panavision 35
Television 4 Perf
1.78:1 (16x9)
1.33:1 (4x3) TV Trans & Safe



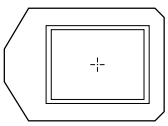
Super Panavision 35
1.33 TV Safe
1.78 & 1.33 TV Trans with Common Top



Super Panavision 35
Television 3 Perf
1.78:1 (16x9)
1.33:1 (4x3) TV Trans & Safe



4 Perf
1.33:1 (4x3) Safe – Academy



Super Panavision 35
4 Perf
TV Trans & Safe/Large TV

1.6 Ground glass options

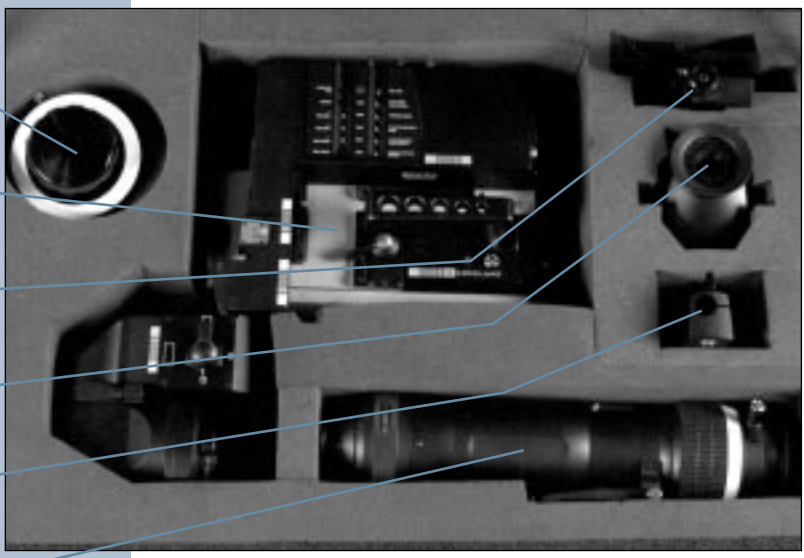
The Millennium can be outfitted with the ground glass in two different locations depending on production demands. Under most conditions, the camera is shipped with the ground glass located in the traditional first image plane location. However, for situations requiring very high-resolution video assist images, the traditional ground glass can be replaced by a clear format screen and a focus screen placed in a second image plane. Foreseeable applications include intensive on-set compositing or non-linear editing.

Millennium ground glasses are indicated with an "M" next to the description. When shooting in Super 35 the Millennium utilizes existing Panaflex Super 35 ground glasses.

CAUTION: *Do not use standard PFX Academy ground glass. Millennium viewing mattes must be used.*

two

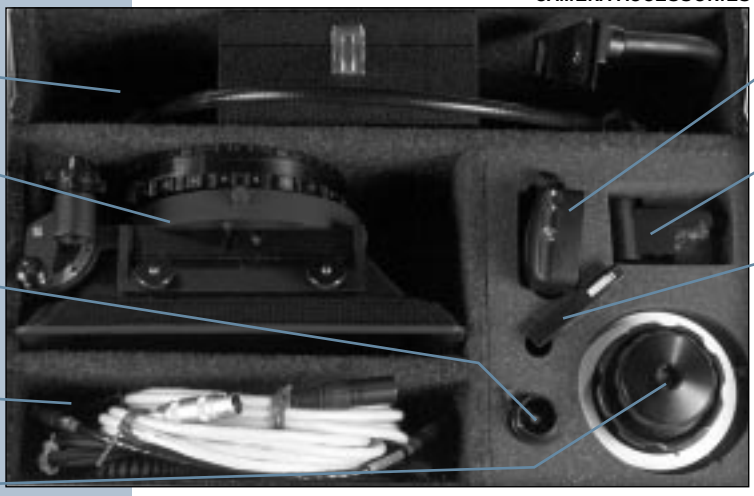
packing and shipping


FOLLOW FOCUS KNOB & GEARBOX
MFFSK, MFFGB
CAMERA BODY
PFX-M
CAMERA BASEPLATE
PCOB
HAND HELD EYEPIECE
MEEP
IRIS ROD BRACKET
MIRB
EXTENSION EYEPIECE
MEPX

2.1 Packing and transport

The camera system is comprised of four cases; one containing the camera body and viewfinding components, the others containing camera accessories. The camera is delivered without either eyepiece attached to the viewing system and it is recommended that it ships this way. It is also advisable to remove the digital display before shipment.

CAMERA ACCESSORIES



LENS LIGHT, HANDLE, FILTER HOLDERS
PLLV, PCLAHP

MATTE BOX & RING
MB

MODULAR FOLLOW FOCUS EXTENSION
MFFEX

POWER, MOTOR & MISC. CABLES

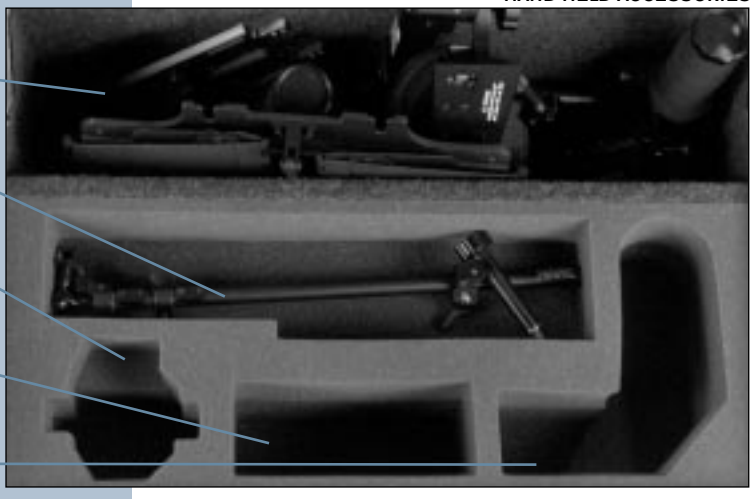
DUAL SPEED KNOB
MFF2SK

REMOTE CONTROL
LAC

DIGITAL DISPLAY
MDD

SPEED CRANK
FXHL

HAND HELD ACCESSORIES



HAND HELD ACCESSORIES AND SUNSHADE
HHGA

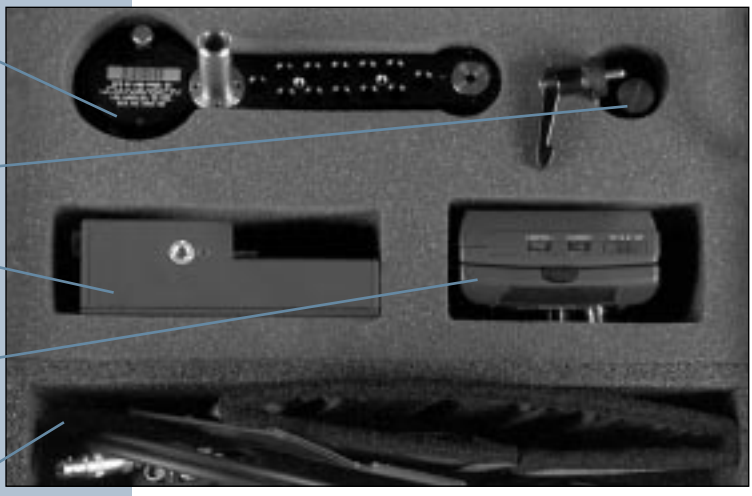
EYEPIECE LEVELER OR EXTENSION EYEPIECE
EPL-M

HAND HELD EYEPIECE
MEEP

MISC.

FOCUS TUBE
(FOR STEADICAM MODE)
MFT

VIDEO ACCESSORIES



MONITOR BRACKET
MMB

WITNESS MONITOR BRACKET
MWMB

5" ON-BOARD MONITOR
LCDM5

WITNESS MONITOR
MWM

VIDEO & POWER CABLES

2.2 Accessory cases

The accessory cases contain all brackets, monitors, cables, etc., required to fully integrate a Millennium camera.

In addition to the nominal complement of accessories there may be other items in the cases, such as:

- Hard mattes
- Camera mounts

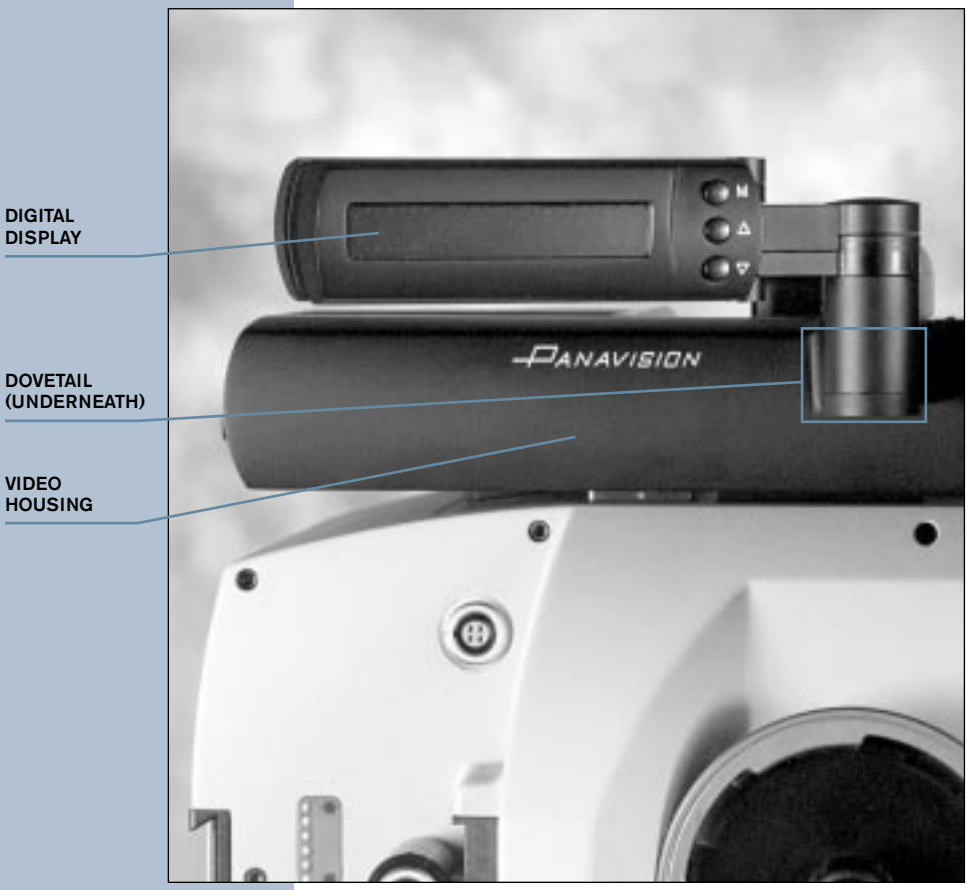
three

assembly

PANAVISION
DIGITAL DISPLAY DOVETAIL
ZOOM MOTOR CONNECTOR
POWER POGOS
PANALENS LITE, RIGHT HAND GRIP OR REMOTE ON/OFF DOVETAIL
24V DC
IRIS ROD BRACKET MOUNT
FOCUS MOTOR CONNECTOR
T-STOP MOTOR CONNECTOR

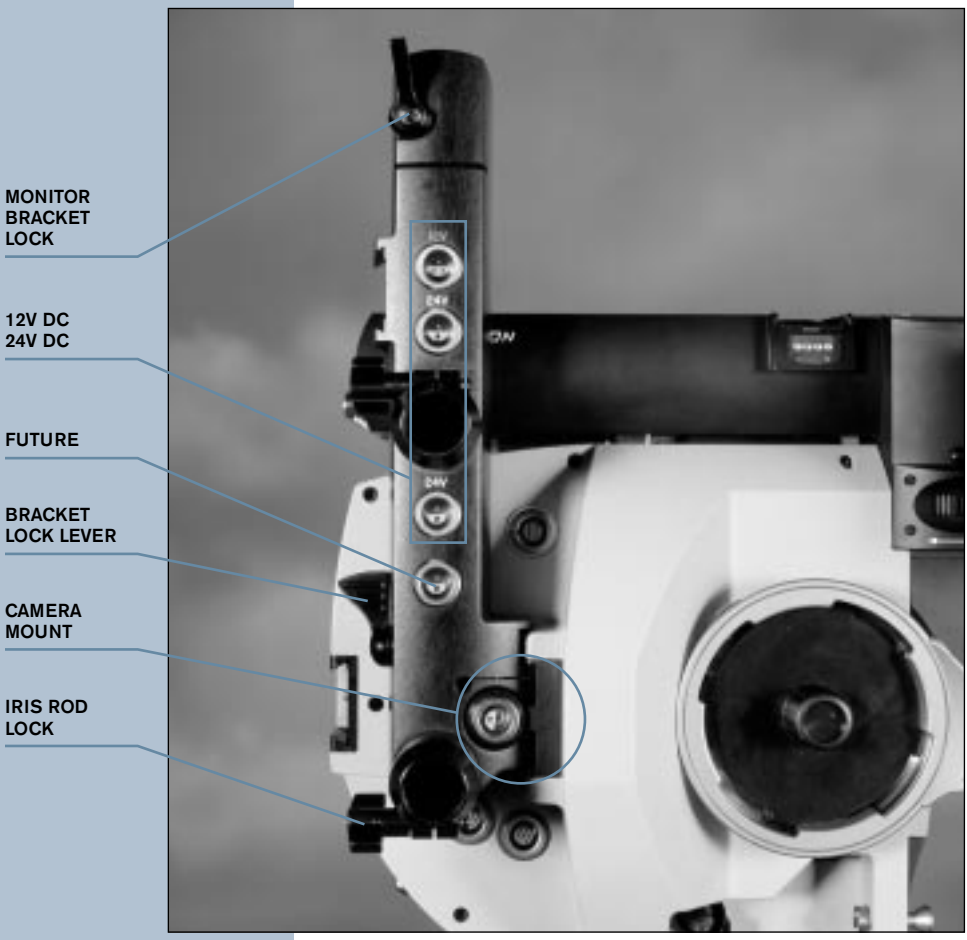
3.1 Camera assembly

This section describes the attachment of each camera accessory and its use, beginning at the camera faceplate (pictured left), and continuing counter clockwise around the camera body.


DIGITAL
DISPLAY
DOVETAIL
(UNDERNEATH)
VIDEO
HOUSING
PANAVISION

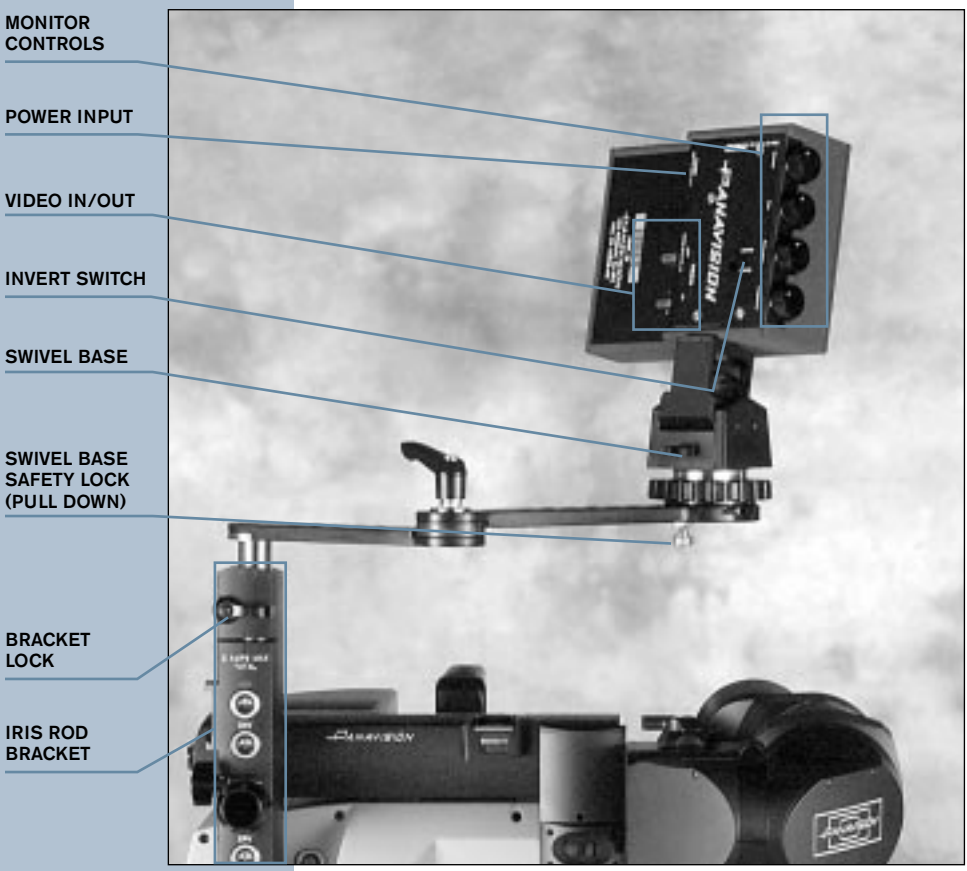
3.2 Digital display

To install, align dovetail on the display with the dovetail on top of the video housing and push on until the Panaclick is heard. To remove, depress the button on the digital display and pull toward you.


MONITOR BRACKET LOCK
12V DC
24V DC
FUTURE
BRACKET LOCK LEVER
CAMERA MOUNT
IRIS ROD LOCK

3.3 Iris rod bracket

Push bracket onto camera mount and tighten bracket lock lever. The iris rod bracket is automatically powered from the camera contacts.


MONITOR CONTROLS
POWER INPUT
VIDEO IN/OUT
INVERT SWITCH
SWIVEL BASE
SWIVEL BASE SAFETY LOCK (PULL DOWN)
BRACKET LOCK
IRIS ROD BRACKET

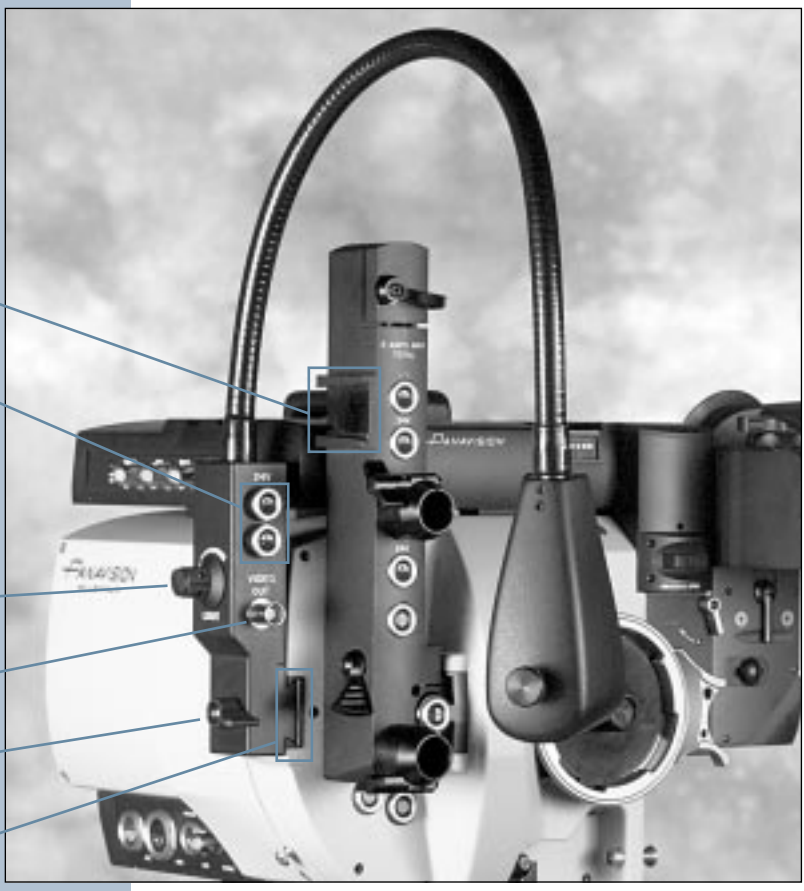
3.4 On board monitor and bracket

Mount the monitor to the swivel base by screwing the thumbscrew into one of the threaded inserts located on the top or bottom of the monitor. Insert the stud of the bracket into the receiver at the top of the iris rod bracket and tighten the lock lever.

Brightness, color, tint, and contrast controls are located on the side of the monitor while power and video in/out are located on the back. If the image is upside down, slide the invert switch up or down. This switch is located on the back next to the video controls.

A sunshade may be attached to the velcro strips around the front edge of the monitor for outdoor use.

Monitor operates on 12V to 24V DC power.


DOVETAIL
24 DC IN/OUT
DIMMER CONTROL
VIDEO OUT
LOCK
DOVETAIL FOR FACEPLATE

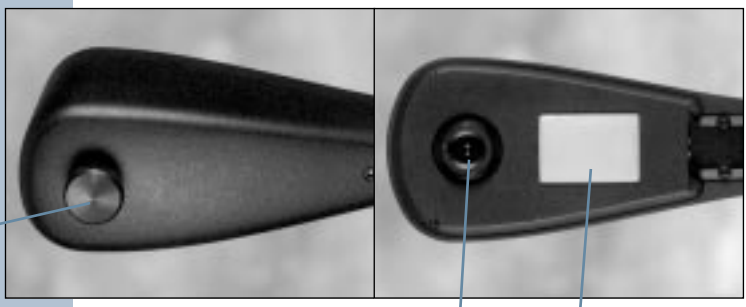
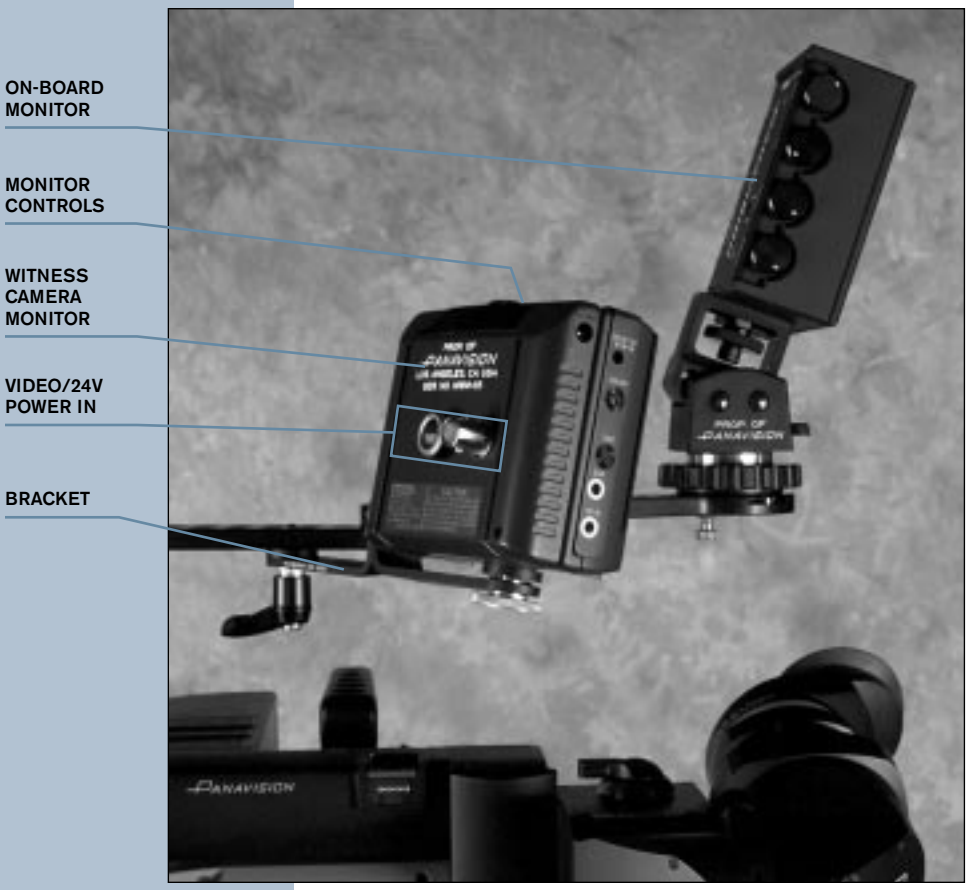


IMAGE ORIENTATION
FOCUS RING
LAMP

3.5 Panalens Lite with video

The Panalens Lite incorporates a small B/W video camera that can be used as a lens witness camera when the Millennium is mounted on a crane or when remote focus is desired. The lens light mounts to a dovetail located on the motor cover side of the faceplate, or it can be mounted to a dovetail on the iris rod bracket. A short power cable is plugged into the 24V DC outlet on the iris rod bracket or faceplate and into the lens light. The Panalens Lite incorporates a dimmer control located on the main body of the light.

The video camera can be placed in the desired position by turning the gooseneck. Image orientation can be adjusted by rotating the control on the back of light. Focus is accomplished by turning the lens barrel on the front of the light.


ON-BOARD MONITOR
MONITOR CONTROLS
WITNESS CAMERA MONITOR
VIDEO/24V POWER IN
BRACKET

3.6 Witness camera monitor and bracket

The witness camera monitor can be mounted to the on board monitor bracket by attaching the threaded knob to any of the tapped holes. This monitor will typically be used in a remote location as the camera is likely to be on a crane. 24V power and video input is provided through connectors on the rear.

A power on/off switch, along with video controls are located on the top of the monitor.

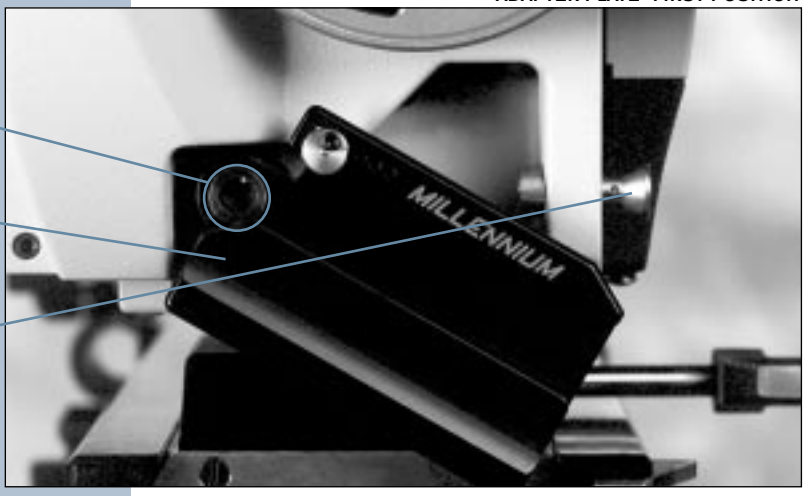
FILM PLANE
TAPE HOOK

3.7 Auxiliary carrying handle (Hollywood Handle)

The auxiliary carrying handle mounts to the rear magazine port and screws into the tapped insert on the rear of the iris rod bracket.

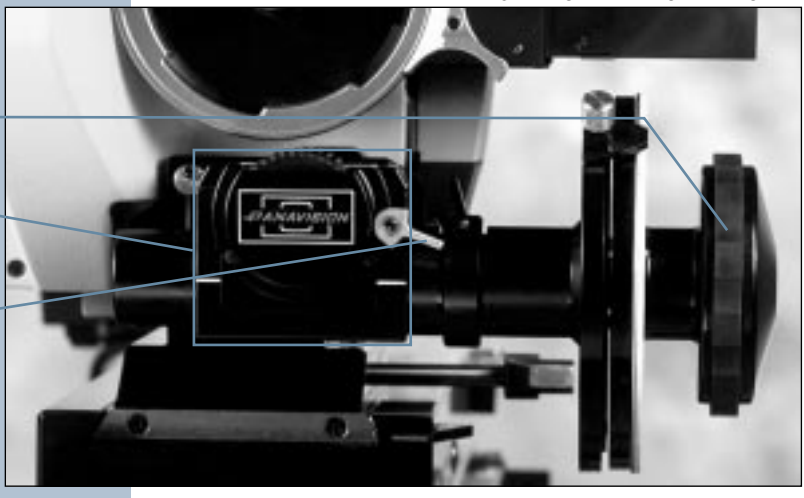
The handle incorporates a film plane tape hook to facilitate distance measurements.

ADAPTER PLATE–FIRST POSITION



ADAPTER PLATE–ENGAGED

GEARBOX AND KNOB–ATTACHED



3.8 Follow focus

The Millennium comes standard with a modular follow focus unit consisting of:

- Follow focus adapter plate
- Modular follow focus gear box
- Single speed knob
- Dual speed knob
- Extension
- Whip
- Speed crank

Please note that all follow focus devices including modular follow focus adapters, standard follow focus and remote follow focus motors must be configured for Panastar use.

The follow focus adapter plate mounts to the camera just below the lens port. Push the adapter onto the stud located below and to the left (viewed from front) of the lens port, then pivot the right edge up into the lock plunger.

To remove, pull out lock plunger, pivot adapter downward and pull off of the stud. The adapter may be left in place during transport.

The gear box and single speed knob are shipped as a unit. The gear box slides into the dovetail on the adapter plate and locks from the front. If a dual speed knob or extension are required, remove the single speed knob by rotating the lock lever on the knob and pulling from the gear box. Install the dual speed knob or extension by pushing it onto the gear box and locking it. To ensure proper operation, be sure the key in the end of the knob or extension is properly engaged into the slot in the gear box.

EXTENSION LOCK
EYEPIECE LOCK
PIVOT LOCK
KNUCKLE
PANAVISION

3.9 Eyepiece option

The Millennium ships with a short hand held eyepiece and an extension eyepiece. Both eyepieces mount in the same fashion.

The camera ships with a protective cover mounted in the eyepiece lock. To remove the cover, depress the button on the lock ring and rotate counter to the lock arrow. Remove the cover and place the eyepiece in the lock ring, making sure the slot in the eyepiece flange is mated with the key in the lock ring. Rotate the lock in the direction of the arrow.

If you are mounting the extension eyepiece, you may find it easier to rotate the knuckle into the straight up (sky) position and then insert the eyepiece into the lock ring. The knuckle pivot lock is a knurled knob located just to the front of the eyepiece lock ring.

See section 6.1 on the viewfinder for further information on the eyepieces.

MILLENNIUM
PANAPLEX
EYEPIECE ATTACHMENT
HEIGHT ADJUSTMENT
SCREW TO PANAHEAD
TILT GEARBOX

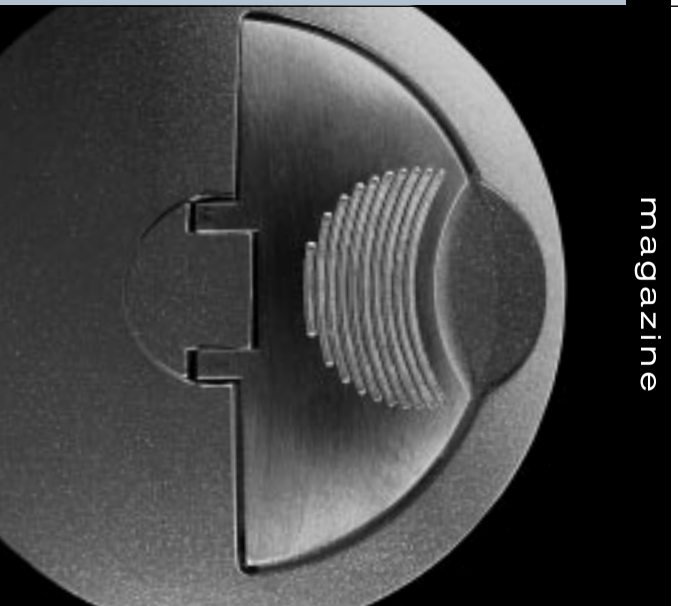
3.10 Eyepiece leveler

The eyepiece leveler is used to keep the eyepiece level as the camera is tilted up and down.

The bottom of the leveler screws into a tapped hole in the tilt gearbox on the Panahead. The top incorporates an eyepiece attachment. Squeeze the two lock tabs together and push onto the stud located on the rear of the extension eyepiece. Height adjustments are made by loosening the lock screws and pushing or pulling the telescoping sections in and out. To remove, squeeze the lock tabs together and pull from the stud.

CAUTION: The eyepiece knuckle *must* be unlocked in order to avoid damage during operation.

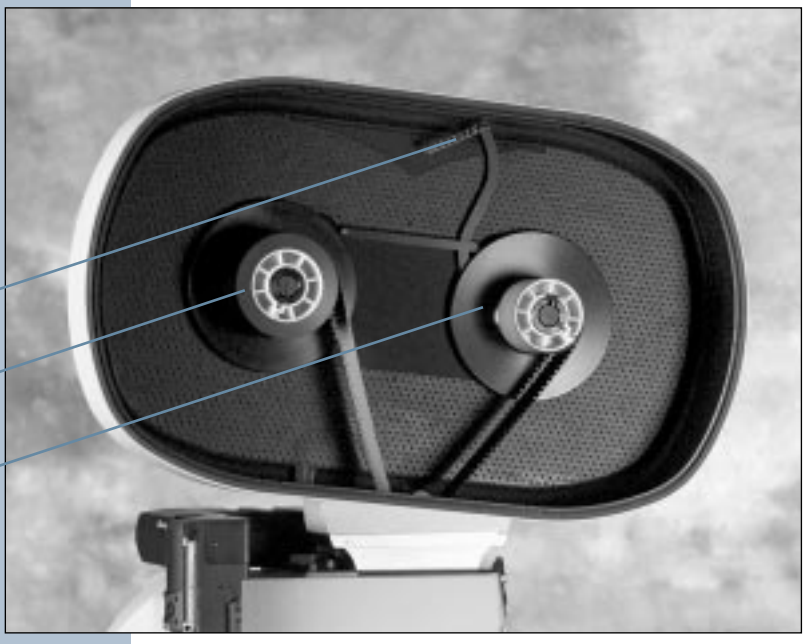
four



magazine

COVER LOCKS

MAG TRAP



FOOTAGE COUNTER MECHANISM

FEED

TAKE UP

4.1 Magazine loading

The Millennium magazine incorporates a dual motor system. The magazine controls the speed of the feed motor and of the take up motor for quiet operation and proper take up tension.

Lift the cover locks out of their recesses and turn both counter-clockwise to release, and remove the cover.

Pull back the top lock of the feed side spindle and transfer the plastic film core from the feed side of the magazine. Place it on the take-up spindle with film slot facing counter-clockwise. If there is not a spare core in the magazine, one must be provided.

The film is loaded in a “99” configuration. The Millennium utilizes a single large roller in the light trap. When loading, the tail from the feed side should be pushed into the slot to the left of the large roller. Grasp the tail of the film and insert it into the right slot of the trap. The tail should now be inside the magazine. Pull the film to the right hand side of the take up film core, locate the slot in the core and insert the end of the film into the slot. Rotate the take up core counter-clockwise several turns.

Replace the magazine cover to its proper seated position and rotate the locks clockwise to lock.

When preparing the magazine for installation on the camera, hold the film entering the take up side stationary, and pull the film from the supply side to the proper length. This prevents the film entering the take up side from pushing up and coming off of the core.

HAND GRIPS
INCHING KNOBS
FOOTAGE INDICATOR LEVER
REMAINING FOOTAGE SCALE
PANAVISION

4.2 Inching

The inching knobs are located on the back of the magazine in the center of the hand grips. To inch, depress and rotate the knobs.

4.3 Checking remaining footage

The remaining footage indicator is located on the back of the magazine between the two hand grips. To read remaining footage push the actuator lever down until it contacts the film, then read the scale. The actuator will return to a neutral position when released.

4.4 Reverse

For double exposure shots, the camera must be switched from forward to reverse. If a single pass reverse shot is desired, the film must be loaded on the take-up spindle. This requires the film to be rewound so that the emulsion side is out.

4.5 Brakes

Two solenoids are used to apply braking to the feed and take-up spindle. This prevents film from unspooling during transportation of a loaded magazine. The solenoids are engaged when the camera is powered down. An audible "click" may be heard when this occurs.

When Millennium magazines are used on other Panaflex cameras, the solenoids will engage and disengage each time the camera is rolled.

five

camera operation

TOP MAGAZINE PORT

MAGAZINE LOCK

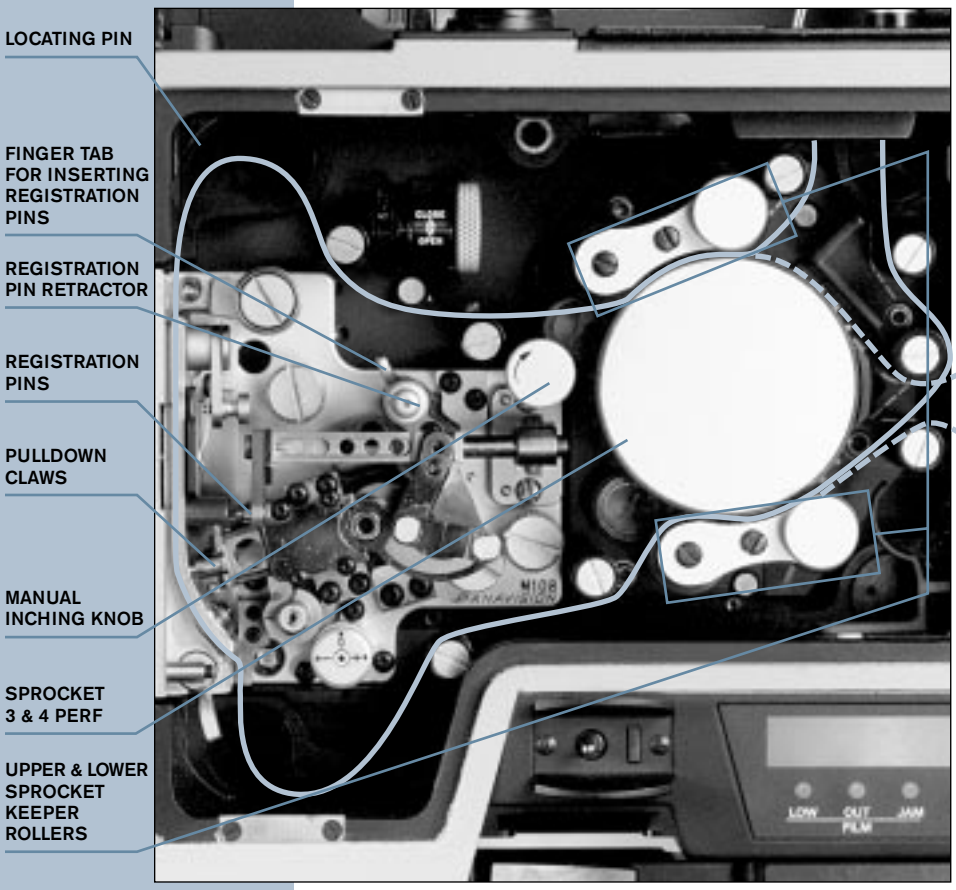
SAFETY CATCH

5.1 Attaching the magazine

The Millennium incorporates a magazine port on the top and back. The top port is generally fitted with a 1000' magazine, while the rear port is used with a 400' magazine in hand held or Steadicam configuration. Mounting for each port is the same.

The magazines mount in locking dovetails. The magazine and port each incorporate a set of contacts. The contacts are located to the front (lens) and must mate for proper operation. In the case of the rear port, the contacts are located on top. Before placing the magazine on the camera port, pull 6"to 8" of film out of the magazine into the film compartment. The lock is located just in front of the contacts. The lock is located on top if the magazine is mounted on the rear port.

Rest one end of the magazine on the camera, feed the film loop through the magazine port and lock the magazine securely in position.


LOCATING PIN
FINGER TAB FOR INSERTING REGISTRATION PINS
REGISTRATION PIN RETRACTOR
REGISTRATION PINS
PULLDOWN CLAWS
MANUAL INCHING KNOB
SPROCKET 3 & 4 PERF
UPPER & LOWER SPROCKET KEEPER ROLLERS
LOW
OUT FILM
JAM
TOP LOAD
REAR LOAD

5.2 Threading the camera

Inch the camera until the pull-down claw is at the bottom of its stroke and out of the film path. Pull out the registration pins retractor and retract the pins in order to clear the gate. Pull out a very short loop from the supply side of the magazine.

NOTE: *While threading the camera, do not inch the camera until the film on the take-up side has been securely located on the sprocket, and the bottom sprocket keeper has been closed.* (Turning the inching knob will activate the magazine take-up motor. Ensure that the film has been properly secured on the main sprocket.)

THREADING THE FILM

Pull about 8" of film from the supply side of the magazine and stretch it towards the bottom left hand corner of the camera. Open the top and bottom sprocket keepers.

Thread the film through the camera exactly as shown on the threading diagram on the inside of the camera door. Double check that it is correct.

Check that the film on the take-up side is properly seated on the underside of the sprocket and close the bottom sprocket keeper.

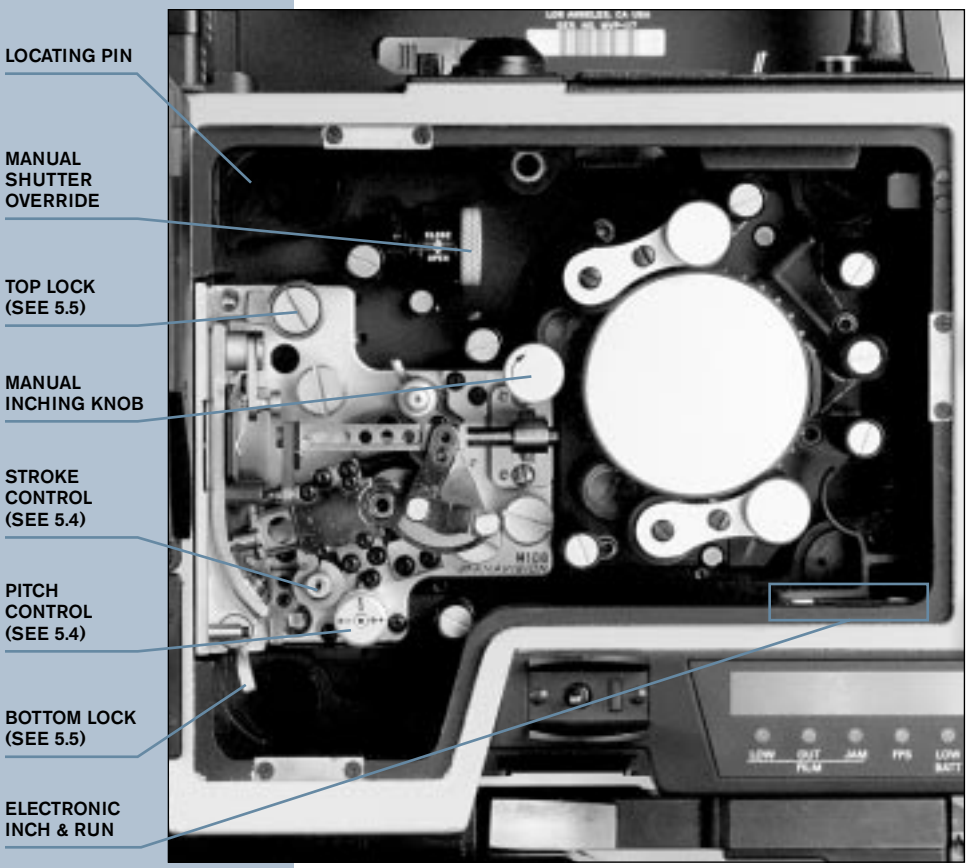
Set the bottom loop so that is just clears the bottom of the camera.

Press a film perf onto the perforation locating pin situated just above the aperture plate. This will ensure that the perforations will be correctly aligned with the registration pins. At the same time, gently press on the edge of the film to ensure the film is fully back into the movement.

Set the registration pins into the perforations by gently pressing the finger tab at the top of the retraction pin. If it does not go easily, recheck the perforation alignment.

Set the top loop by pulling the film off the perforation locating pin. The top loop should be set to clear the locating pin.

Engage the film on the top of the sprocket and close the top keeper. If the camera has been disconnected, re-connect the camera power supply.


LOCATING PIN
MANUAL SHUTTER OVERRIDE
TOP LOCK (SEE 5.5)
MANUAL INCHING KNOB
STROKE CONTROL (SEE 5.4)
PITCH CONTROL (SEE 5.4)
BOTTOM LOCK (SEE 5.5)
ELECTRONIC INCH & RUN

5.3 Internal manual inching
Electronic inching
Electronic run
Manual shutter override

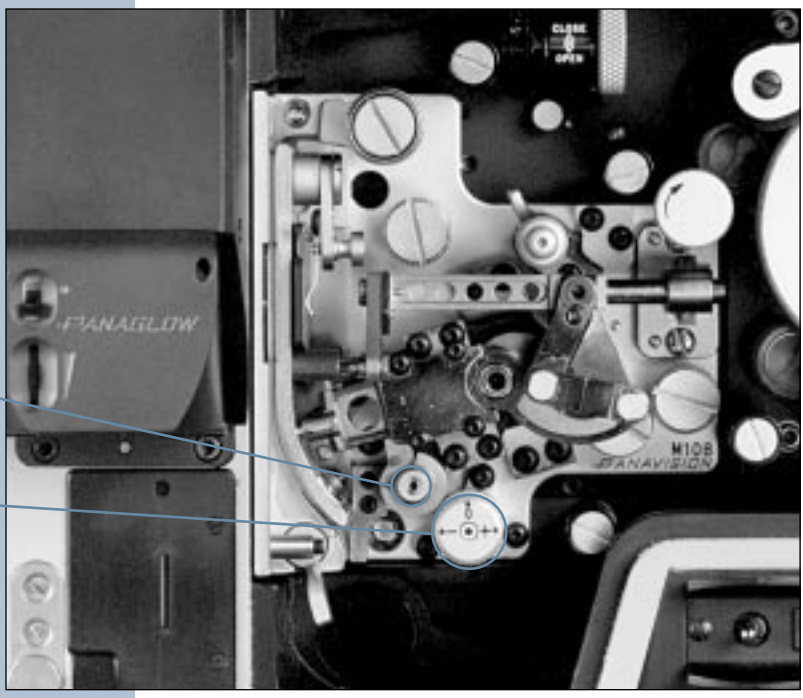
To manually inch, rotate the manual inching knob in the direction of the arrow.

NOTE: *The magazine will take up.*

To electronically inch or run, depress either the inch or run buttons to activate.

The manual shutter override should be used only in an emergency situation. To utilize, set the shutter angle switches on the control panel on the back of the camera to zeros. Remove the film and the pressure pad. Normal shutter angle markings are engraved on the back of the shutter and can be set by rotating the manual adjustment open or close.

If the camera is running, the shutter angle will be displayed on any of the digital displays and will dynamically change as the manual override is opened or closed.



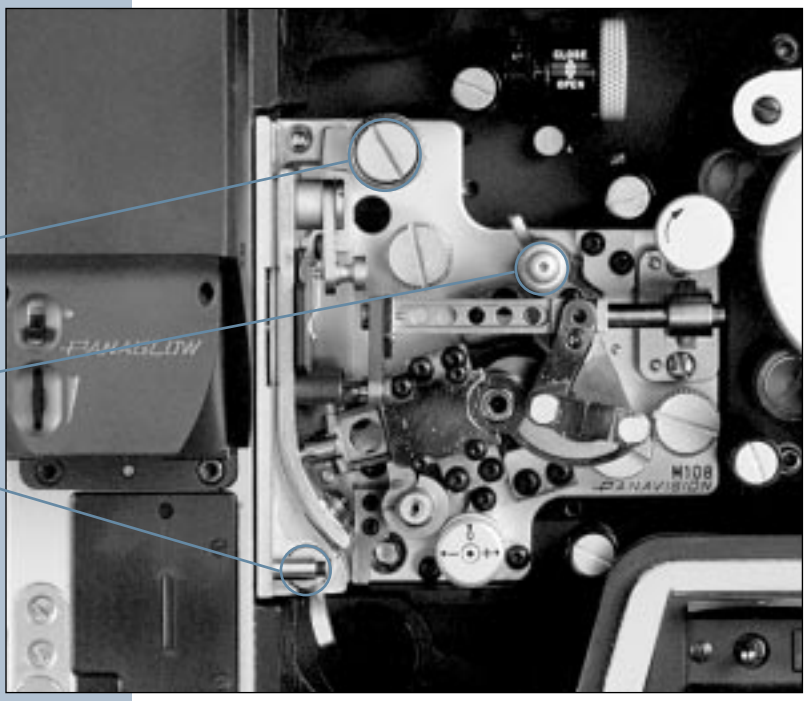
STROKE CONTROL

PITCH CONTROL

5.4 Pitch and stroke adjustment

To ensure quiet running, adjust the pitch adjustment by running the camera at speed and rotate the pitch control knob clockwise or counter-clockwise until the perforation noise is minimized. This adjustment should be made at every reload.

The stroke adjustment is made utilizing a special tool and is generally preset at time of rental. This adjustment is made in order to optimize the amount of film which is pulled down each time ensuring clean entry of registration pins. The stroke adjustment is made while the camera is running. However, in order to minimize the possibility of damage, it is advisable to only insert or remove the tool while the camera is off.


TOP LOCK
REGISTRATION PIN RETRACTOR
BOTTOM THUMB LOCK

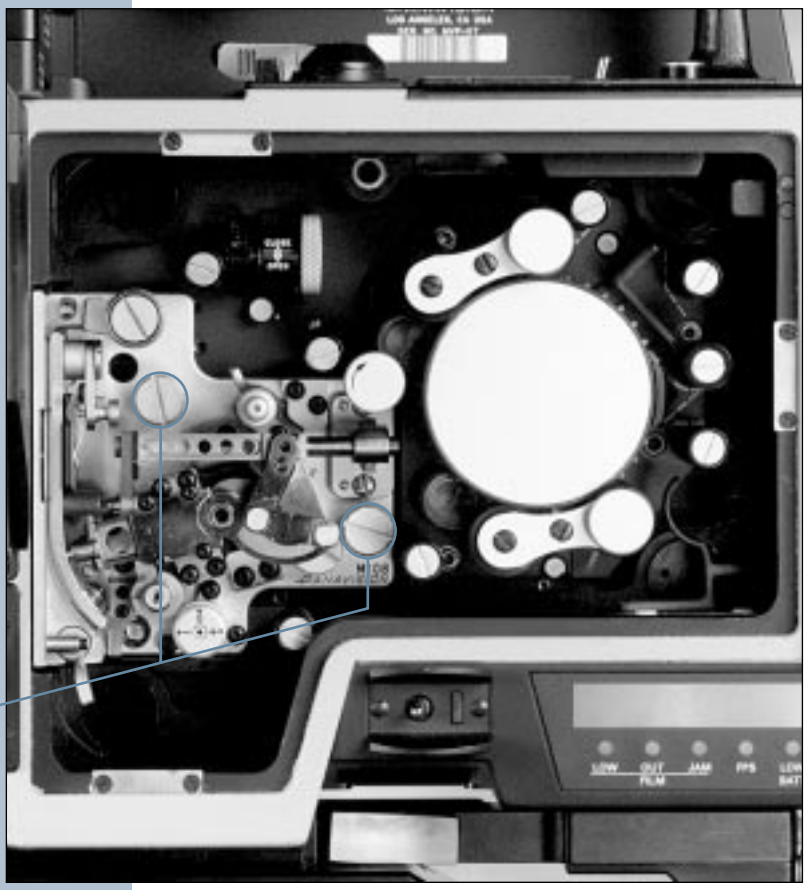
5.5 Removing the aperture plate

To remove the aperture plate, inch the camera until the pulldown claw is at the bottom of its stroke, disengaged from the film, with the registration pins fully engaged.

Pull out the spring-loaded registration pin retraction knob and pull the pins back to clear the gate.

Turn the top lock clockwise and the bottom thumb lock counter-clockwise. Hold the bottom lock horizontally and pull to remove the plate.

Replace the aperture plate by holding the bottom lock horizontally and pushing the plate onto the top locating pin. Push the bottom lock down and set top lock by pulling it out and turning it counter-clockwise.



MOVEMENT SCREWS

5.6 Removing, replacing, and lubricating movement

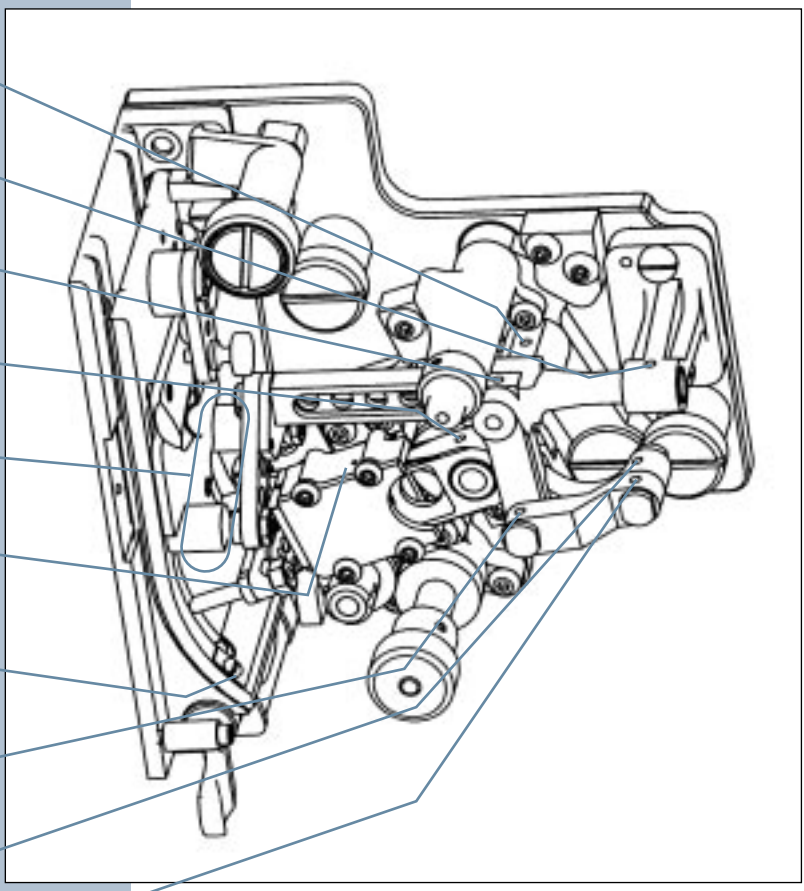
Inch the camera until the pulldown claws are at the bottom of the stroke and fully withdrawn from their slots. Stop just before the pulldown claw arm obstructs the lower movement lockdown screw.

With a wide screwdriver, gently loosen the two short movement screws which secure the movement plate. Unscrew approximately five turns until they become loose in their bushings. Remove movement by pulling on the pitch control knob, wiggling to loosen.

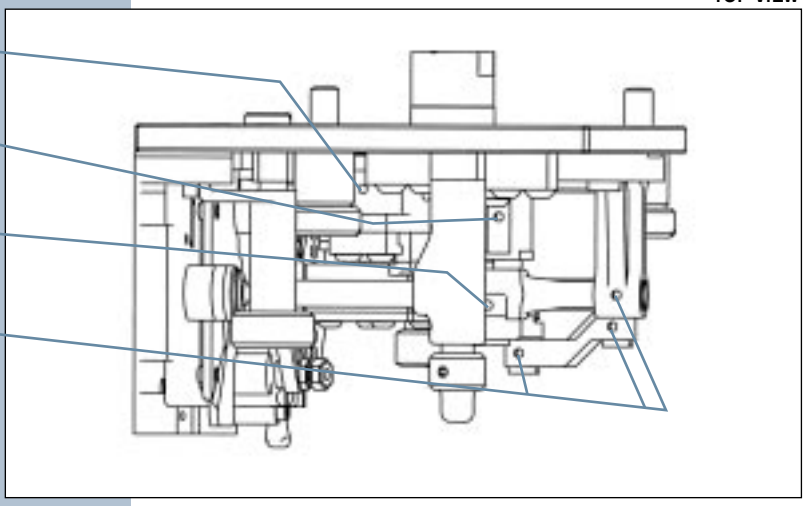
To replace the movement, inch the camera until the pins of the motor coupling are horizontal, and the witness mark is downwards. Similarly, align the movement shaft so that it matches the camera coupling. Hold the movement with both hands using the left hand for support and the right hand to guide the movement into position.

Hold the movement with the thumb on the pitch control knob and the forefinger on the top aperture dog-lock. Then slide the entire unit into the camera interior and engage the coupling in the camera body with the witness marks aligned. Secure the movement with the short knurled-head capture screws and tighten with a wide screwdriver. If the screws do not bottom out solidly, the movement is not seated properly.

NOTE: *The interface between the motor drive coupling and the movement coupling is offset so they cannot be assembled incorrectly. If the movement does not seat, inch the camera back and forth slightly until the couplings fit snugly together. If it still does not seat, remove and check the drive and movement couplings for possible damage.*


OIL
OIL
OIL
OIL
REGISTRATION PIN BUSHINGS (NOT SHOWN)
OIL
SILICONE FELT PADS
OIL
OIL
OIL

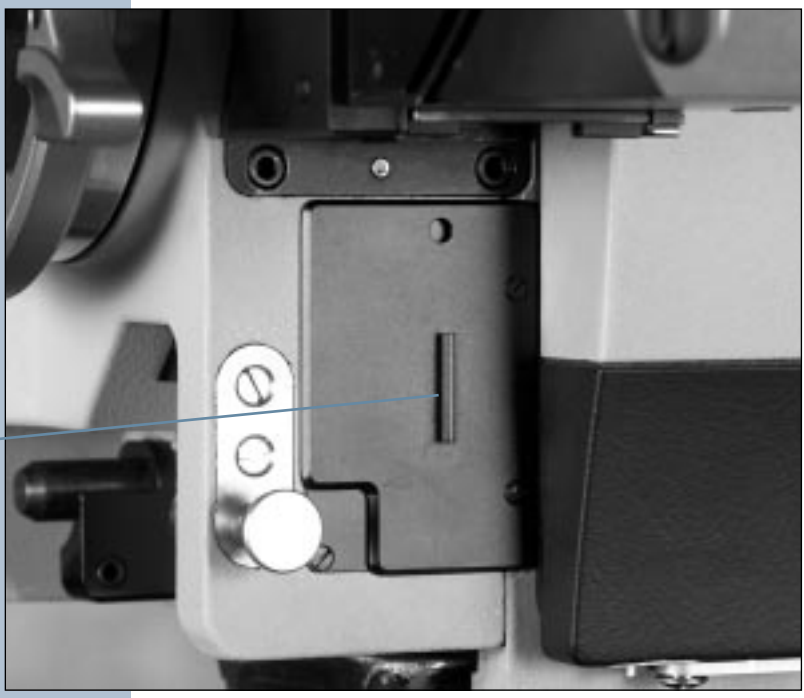
TOP VIEW


OIL
OIL
OIL
OIL

5.6 Lubricating movement

It is suggested that the movement be lubricated with the included oil every two weeks or 100,000 feet.

The pads at the bottom of the gate should be siliconed as required.


GEL FILTER
DOOR

5.7 Behind-the-lens filter

In addition to places for three or four filters in the various Panavision matte boxes, there is also a provision on all Millennium cameras to place a gelatin filter just in front of the film plane.

CAUTION: *Millennium filter holders are not interchangeable with other Panaflex cameras or vice versa. They are keyed to prevent inadvertent insertion.*

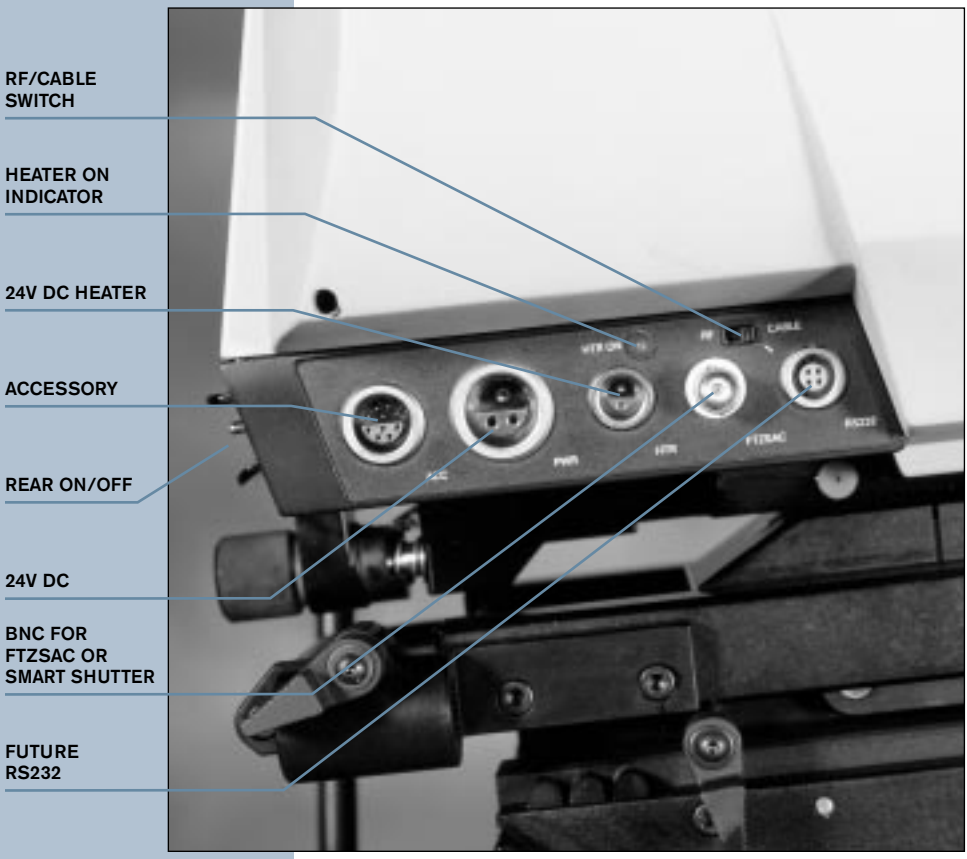
Millennium cameras are supplied with a box containing 12 gelatin filter holders.

Before a shoot, the camera assistant should very carefully mount a selection of gelatin filters into the holders as requested by the cinematographer. Panavision Inc. and its distributors worldwide can supply a gelatin filter punch for cutting filters to shape. Be careful to keep dust, finger marks and other blemishes off the surface of the filters.

The use of a gelatin filter between the lens and the film affects the lens back focal distance by about 1½ thousandths (.0015) of an inch. This is not likely to have a deleterious effect on the focus of any lens unless it has a particularly short focal length and/or wide aperture. If using gelatin filters, Panavision technicians can, upon request, alter the flange focal depth setting of the camera accordingly.

To fit the gelatin filter holder into a Millennium camera, slide back the dust/light/sound proof cover below the viewfinder tube, insert the filter holder inwards and upwards, close the cover slide and remind the cinematographer that a behind-the-lens filter is in place so that he can make appropriate allowances in the exposure calculations.

NOTE: *Make sure that the filter holder is fully inserted and that the door is fully closed.*


RF/CABLE SWITCH
HEATER ON INDICATOR
24V DC HEATER
ACCESSORY
REAR ON/OFF
24V DC
BNC FOR FTZSAC OR SMART SHUTTER
FUTURE RS232

5.8 Environmental concerns

The Millennium is equipped with on-board heaters in the faceplate and midrib for use in cold conditions. It is advisable to plug in the heater cable 30 minutes prior to use. A separate battery should be used to power the heaters. Note that batteries can lose up to 50% of their capacity at 32°F as compared to 72°F. Magazine and lens heater covers are abailable and should be used in very cold temperatures.

The camera is sealed against normal dust and moisture conditions. However, water boxes, weather protectors, dust covers, spray deflectors and other protective devices are available.

six

viewfinder

SPHERICAL / ANAMORPHIC SELECTOR

OPEN/CLOSE EYE SELECTOR

EYEPIECE LOCK

PIVOT LOCK

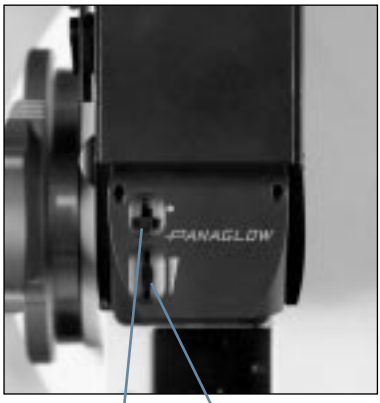
FOCUS TUBE

VIDEO IRIS

NEUTRAL DENSITY SELECTOR

FOCUS TUBE SAFETY LOCK

FOCUS TUBE LOCK



PANAGLOW ON/OFF

PANAGLOW BRIGHTNESS

6.1 Focus tube

To add or reduce drag to the eyepiece knuckle, rotate pivot lock.

To select spherical or anamorphic, rotate the selector to spherical or anamorphic.

To open and close the eyepiece, rotate the open/close eye selector. This selector should be closed if film is being shot and no operator is viewing the scene through the eyepiece.

To compensate for lighting situations, rotate the video iris control open or closed.

The spring-loaded neutral density selector reduces the amount of light being passed through the viewing system, compensating for very bright lighting situations. Normal filters are ND 0.6 and ND 0.9.

The focus tube may be removed from the camera when remote crane or Steadicam operation is desired.

To remove the focus tube it is best to remove any attached eyepiece first. Unlock the safety lock located on the front of the video tube just below the video iris. Push in and hold the focus tube lock, then gently pull up on the focus tube and slide it off of the camera body. It may be easier to pull with the hand holding the focus tube lock and push the tube from the bottom with the other hand.

After removal of the focus tube, the video cover should be closed and locked to protect the window and prevent any unwanted light from entering the video path. This is best done by applying pressure with your thumb to the edge of the door which is located at the bottom of the video tube still attached to the camera. Once hinged down, close the door and lock it by rotating the focus tube knob using your fingertip.

To reinstall, unlock and open the video door making sure that it is completely stored and locked. Align the yellow marks on either the front or back of the focus tube with the corresponding marks on the video tube, making sure the focus tube is flat against the video tube.

Push and hold the focus tube lock and gently slide the focus tube down into the dovetail, making sure the focus tube reaches the bottom and the lock is properly engaged. Rotate the safety lock in the direction of the lock arrows.

The Panaglow is used to illuminate the format markings when shooting against a dark background or in low light conditions. Slide the switch to activate the Panaglow and rotate the intensity wheel to control brightness.

LEFT, CENTER,
RIGHT BUTTON
FOCUS
(DIOPTER)
EYEPIECE
LOCK
PANACLEAR
CONNECTOR

6.2 Hand held eyepiece

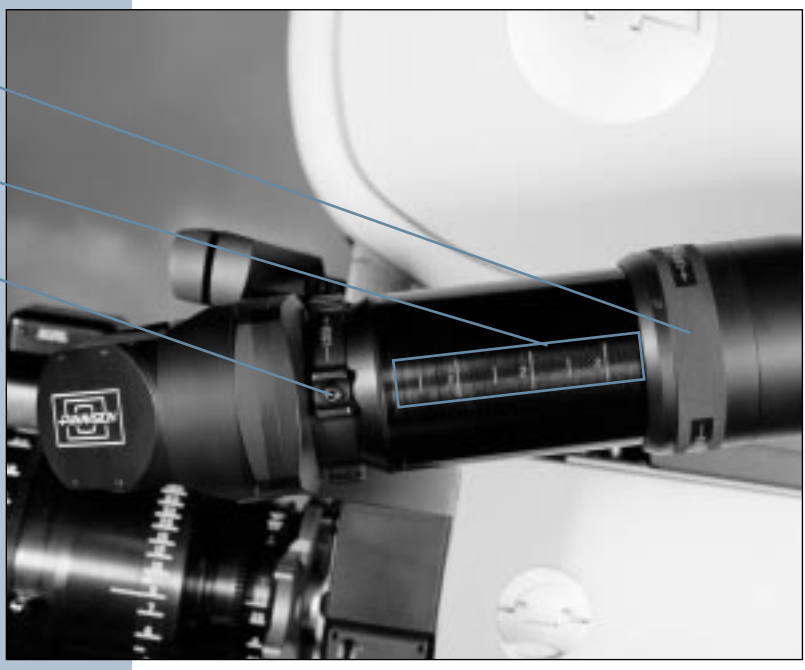
To unlock the eyepiece lock, press the safety button and rotate the lock down. Gently pull the eyepiece off.

Each eyepiece has a notch that matches a key in the lock. Make sure that the notch and key are properly aligned, then rotate the lock in the direction of the lock arrow.

To set the left, center or right viewing position, press the lock button on the eyepiece, and rotate the eyepiece to the desired position. There are detent positions for left, center and right.

Panaclear is used to keep the eyepiece fog free. If conditions require, plug the Panaclear into a top or back handle equipped with a Panaclear plug. Panaclear handles also have on/off switches.

To properly focus the eyepiece, first defocus the camera lens and rotate the diopter focus ring to achieve the best crosshair focus on the ground glass. A white marker ring around the focus may be marked with a pencil for individual settings.


TELESCOPING LOCK
TELESCOPING GRADUATIONS
EYEPIECE LOCK

WHITE MARKER RING
PANACLEAR CONNECTOR
FOCUS (DIOPTER)
MAGNIFIER LEVER
EYEPIECE LEVELER
MILLENNIUM

6.3 Extension eyepiece

For operator comfort, the extension eyepiece can be telescoped from its compressed position to any desired length up to its maximum position. Image size, focus and brightness remain the same throughout all positions.

To telescope, rotate the telescoping lock toward the camera to unlock, pull the eyepiece to the desired viewing position and rotate the telescoping lock in direction of lock arrow.

To properly focus the eyepiece, first defocus the camera lens and rotate the diopter focus ring to achieve the best crosshair focus on the ground glass. A white marker ring around the focus may be marked with a pencil for individual settings.

Panaclear is used to keep the eyepiece fog free. If conditions require, plug the Panaclear into a top or back handle equipped with a Panaclear plug. Panaclear handles also have on/off switches.

The magnifier enlarges the center of the image two times when it is necessary to critically focus on a part of the scene. Push the lever down to engage the magnifier. Flip the lever up to disengage.

The extension eyepiece has an arm that can be pivoted out and used to rest the eyepiece on the camera door hinge pin. The arm is located on the side of the eyepiece closest to the camera.

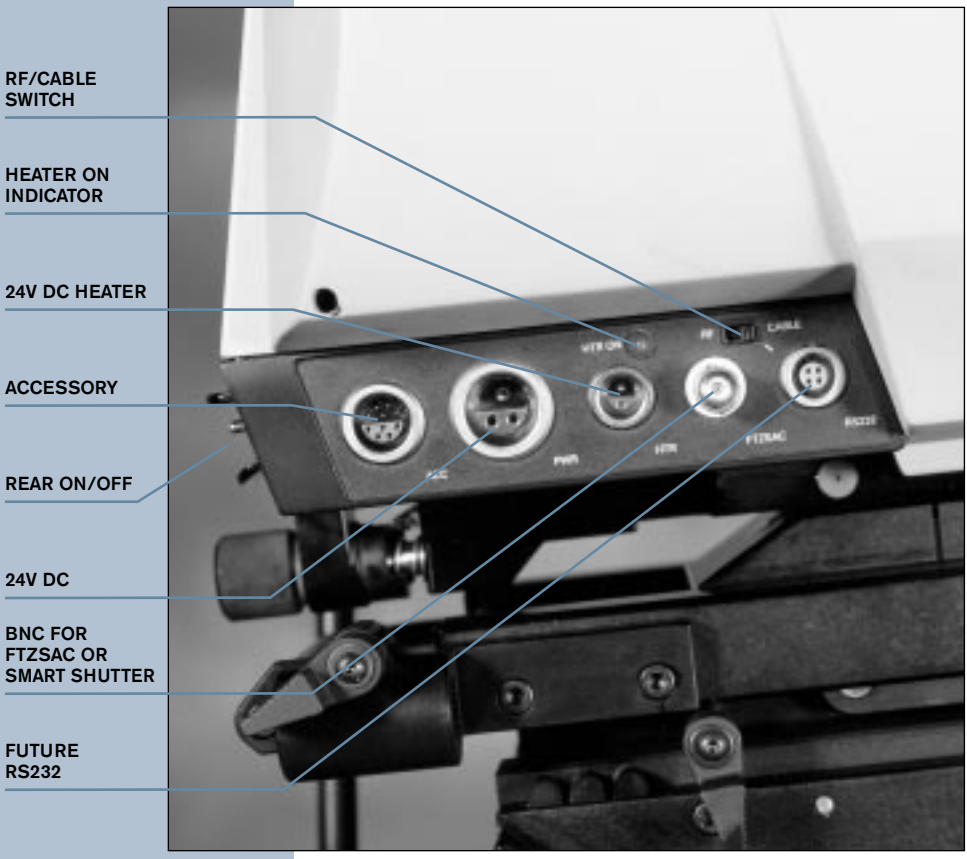
The eyepiece leveler is used in order to maintain operator viewing position as the camera is being tilted up and down. The leveler is attached to the head via a screw shaft and can be used on Panahead as well as fluid heads.

Attach the leveler to the eyepiece by squeezing the silver locking tabs together and inserting the leveler stud into the mount. For more information on the eyepiece leveler, see Section 3.1. The leveler can be adjusted to the desired length by unlocking any of the three locking collars and telescoping the shaft.

NOTE: *Make sure the pivot lock is loose when using the leveler.*

seven

displays and controls


RF/CABLE SWITCH
HEATER ON INDICATOR
24V DC HEATER
ACCESSORY
REAR ON/OFF
24V DC
BNC FOR FTZSAC OR SMART SHUTTER
FUTURE RS232

7.1 Connector panel

Accessory Connector: used for many external control devices such as:

- Remote on/off.
- Phaseable synchronizing boxes.

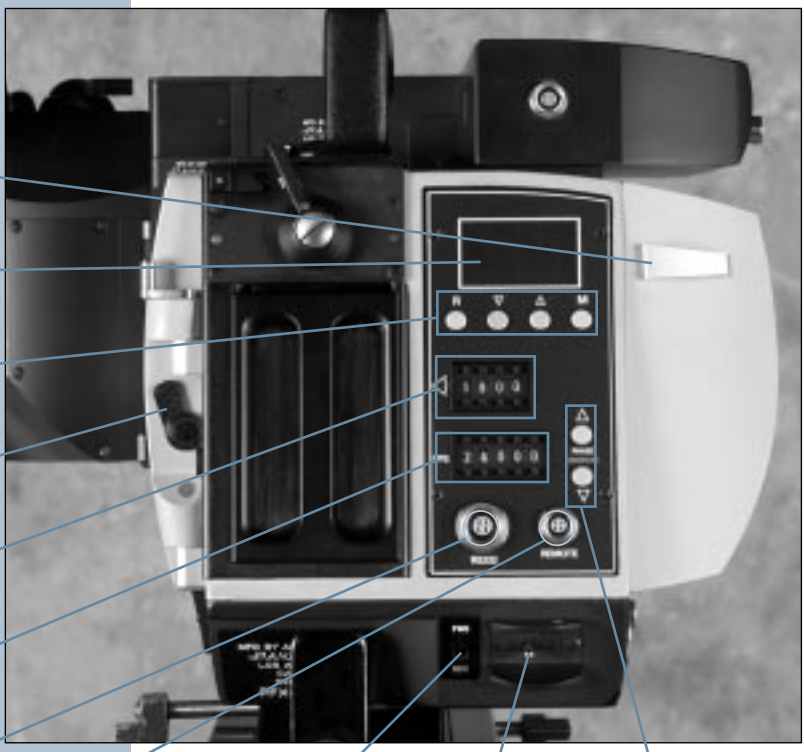
24V DC: provides for camera power.

24V DC Heater: under cold conditions, it is advisable to warm the camera. A separate 24V DC battery is best. The htr on indicator illuminates when heaters are on.

RF/Cable: selects wired or wireless operation.

FTZSAC: for wired operation with FTZSAC, Smart Shutter, or Remote F and T controllers.

RS232: For use with digital link FTZSACs.


EYEGLASS HOLDER
DIGITAL DISPLAY
DISPLAY CONTROLS
DOOR SAFETY
SHUTTER ANGLE SELECTOR
SPEED SELECTOR
FUTURE RS232
LOCAL AREA CONTROL (REMOTE)
FORWARD/ REVERSE
CAMERA ON/OFF
PHASE CONTROLS

7.2 Rear panel and controls

Digital Display: This two-line display continuously shows camera speed on the top line, and displays shutter angle, battery voltage, footage and display brightness on the second line, depending upon mode selected. Upon camera power-up, the display will flash the software version of the control panels first and the camera version second.

Display Controls: used to page through displays and set specific parameters.
- M: scrolls though mode displays. Bottom line only.
- Up/down arrows: set display brightness or preset footage.
- R: reset footage counter to zeros.

To Display The Following: (all on second line)
- Shutter Angle: press M until xxx DG appears (only displayed when camera is running).
- Footage: press M until xxx FT or xxx MTR appears. Preset footage can be set by using the up/down arrows.
- Frames: press M until xxx FRM appears.
- Brightness: press M until Bright appears, use the up/down arrows to set display brightness.
- Battery Voltage: press M until Batt. xx.x appears.
- Set: press M until SET appears. This confirms switch settings.

To Set Shutter Angle: Use selector switches to enter desired shutter angle. Shutter angle may be set in 1/10th degree increments, from 11.2° to 180°.

To Set Speed: Use selector switches to enter desired speed. Speed may be set in 1/1000th of a frame increment, 3-50 fps.

To Phase:
- With the camera running, use phase up/down buttons to phase mirror to desired position.
- The phase arrows can also be used to rotate the mirror/shutter 180° to facilitate gate checking (when camera is off).

RS232: Future.

Remote: plug for local area control (LAC) (see 7.4).

To Set Forward/Reverse: The forward/reverse switch is located on the bottom rear of the camera just below the control panel. Slide switch to desired direction.

To Turn Camera On/Off: (from rear or side switch)
- To turn on the camera, push on/off switch to the right, then the switch returns to a center position.
- To turn off the camera, push on/off switch to the left, then the switch returns to a center position.

“M” MODE SELECT

DIGITAL DISPLAY

ON/OFF SWITCH

STATUS INDICATORS

7.3 Operator side panel and controls

To Turn Camera On/Off:
(from rear or side switch)

- Push on/off switch to the right to turn on the camera. The switch returns to a center position.
- Push on/off switch to the left to turn the camera off. The switch returns to a center position.

STATUS INDICATORS:

Low/Out/Jam: indicates status of film in the camera. Low indicator will illuminate with approximately 20' of film remaining. The out indicator illuminates within 5'.

Low Batt: indicates low battery voltage (21 volts) requiring a battery change.

FPS: indicates an error in camera running speed (out of sync).

Mode: scrolls through displays appearing in the digital display.

M
PANAVISION

7.4 Digital display

Double-sided display indicates camera speed on the far left segment, and the selected mode including shutter angle, film counter (displayed in either feet, meters or frames) and display brightness. The opposite side displays M: (mode) button only.

- M: scrolls through mode displays
- Up/down arrows: set display brightness or preset footage

NORMAL OR MAX. SHUTTER ANGLE (RAMP MODE)
MAXIMUM SPEED
TIME
CAMERA ON/OFF
SEE 7.2
MINIMUM SHUTTER ANGLE (RAMP MODE)
MINIMUM SPEED (RAMP MODE)
RAMP/XTAL
NORMAL SPEED
SEE 7.2
HI/LO START

7.5 Local area control (LAC)

The LAC provides remote operation of all camera functions and the ability to execute ramp speed/shutter compensated shots. The LAC duplicates the controls and operation from the camera back panel (see 7.2). An additional set of speed and shutter angle switches have been included to facilitate ramp speed/shutter compensated shots as well as a set of time switches and ramp/xtal switch.

Normal Remote Operation:

- Plug LAC into back panel remote connector. The back panel display will blackout and the LAC display will illuminate.
- Set RAMP/XTAL to XTAL and set graphic coordinated speed and shutter angle switches to desired settings (see 7.2).
- Camera on/off switch is located on top of the LAC.

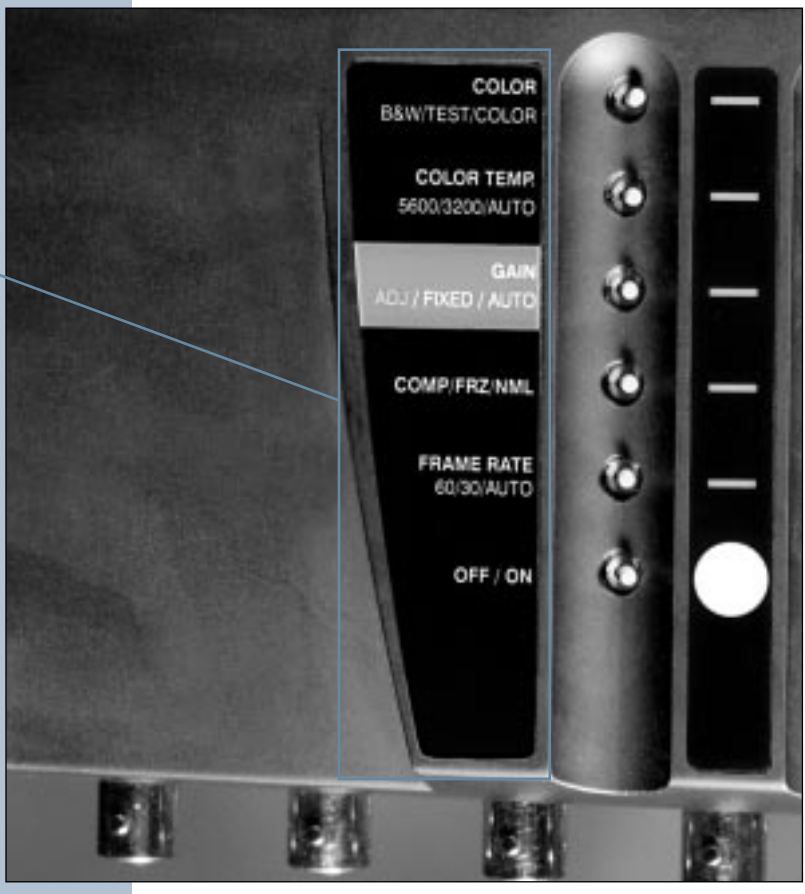
To Set Ramp Speed/Shutter Compensation:

- Set RAMP/XTAL switch to ramp. The display will show HI? LO?
- Determine desired speed range and set minimum and maximum speeds in the respective windows.
- Calculate required shutter angles and set minimum and maximum shutter angles in the respective windows.
- The shot will be executed by the camera in the time set in the time window. Set desired time.
- The HI? LO? in the display determines the starting parameter of the shot. Select HI by pressing the HI button, if the shot is to start at the maximum speed and move to the minimum speed.
- Select LO by pressing LO button if the shot is to start at the minimum speed and move to the maximum speed.
- Turn the camera on. The camera will run at either the maximum or minimum speed depending on which was selected. By pressing either the HI or LO button, the camera will execute the desired speed and shutter change in the set amount of time.
- Once the shot is complete, pressing the HI or LO will reverse the shot.

NOTE: *Only three of the four speed and shutter settings are required: i.e., a 15 to 24 fps speed change is desired with an ending shutter angle of 180º. In lieu of calculating the minimum shutter angle, set the minimum window to zeros, the maximum window to 180º and 15/24 in the respective FPS window. Determine HI? or LO? as above. When the shot is executed, the camera will calculate the missing shutter angle.*

eight

video assist



VIDEO ASSIST CONTROLS

8.1 Video assist controls

COLOR:

- Color: provides color picture output.
- Test: displays color bars.
- B/W: provides black and white picture output.

COLOR TEMP:

- Auto: automatically adjusts color temperature balance.
- 3200: selects tungsten color balance.
- 5600: selects daylight color balance.

GAIN:

- Auto: automatically adjusts video gain levels to compensate for bright or dark scene contrast.
- Fixed: provides a fixed 5db gain boost.
- ADJ: used in conjunction with the video gain switch to set multiple fixed gain settings. Push the Line/Video Gain switch left or right to increase or decrease gain.

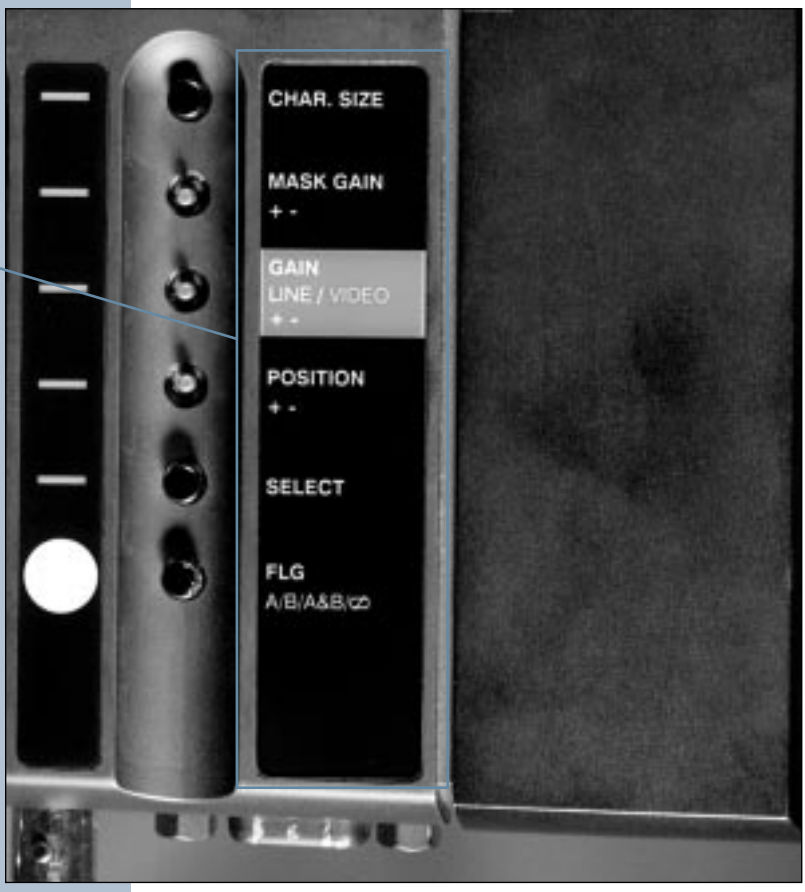
COMP/FRZ/NML:

- NML: provides normal video output.
- FRZ: freezes the picture allowing for the moving of the camera or subject.
- COMP: overlays the frozen image with a live image for proper alignment of the camera or subject.

FRAME RATE:

- Auto: provides flicker-free video output to all camera speeds.
- 30: outputs single field resolution video.
- 60: outputs dual field resolution video .
- Off/On: turns video off or on.

FRAMELINE / CHARACTER GENERATOR CONTROLS



8.2 Frame line and character generator controls

- **Char Size**: pressing this button multiple times scrolls through various options of character size, Panatape display, and character off.
- **Mask Gain**: used to electronically mask areas outside of the frame lines.
  - : lightens the mask.
  + : darkens the mask.
- **Line/Video Gain**: controls the brightness of the frame lines or video gain.
  - : brightens the the frame lines.
  + : darkens the frame lines.
- **Position**: used to move frame lines in/out and up/down.
- **Select**: pressing select will step through the options of establishing A & B frame lines, selecting dashed or solid frame lines, and mask on/off.

FLG:

- A: displays the A frame lines and masks.
- B: displays the B frame lines and masks.
- A&B: overlaps both frame lines.
- 0: turns all frame lines and masks off.

To Set Frame Lines:

- Set FLG to A or B, press select until left hand frame line flashes.
- Use the Position switch to move the frame line to the desired position. Press Select, and the top frame line will start to flash, allowing use of the position switch to move the frame line to the desired position. Repeat for the rest of the frame lines.

Electronic De-Anamorphoser:

- To de-anamorph the video image, simultaneously move Position and Mask Gain to the right and hold 1 to 2 seconds. To return to normal, simultaneously move Position and Mask Gain to the left and hold 1 to 2 seconds.

RGB OUT
FRAMELINE
& CHARACTER
GENERATOR OUT
PANATAPE IN
PANAVISION
MILLENNIUM

8.3 Video outputs

RGB: provides red, green, and blue analog out, requiring 9 pin D connector to the BNC break-out cable.

Frameline/FPS: provides both frame line mask and character generator information.

Video: provides video only (no frame lines, mask or character generator information).

Panatape: provides an input for the Panatape in order to display range information in the video signal.

8.4 Display Options

To display elapsed film in either feet, meters or frames, press and hold CHAR SIZE and push the POSITION switch to the right.

To display all information with a black background, press and hold CHAR SIZE and push the POSITION switch to the left.

To display the main information screen, simultaneously push MASK GAIN to the right and POSITION to the left. Reverse the directions to turn off the information screen.

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